



Geographic Information System

Spatial Statistics I Lab Practice

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Outline

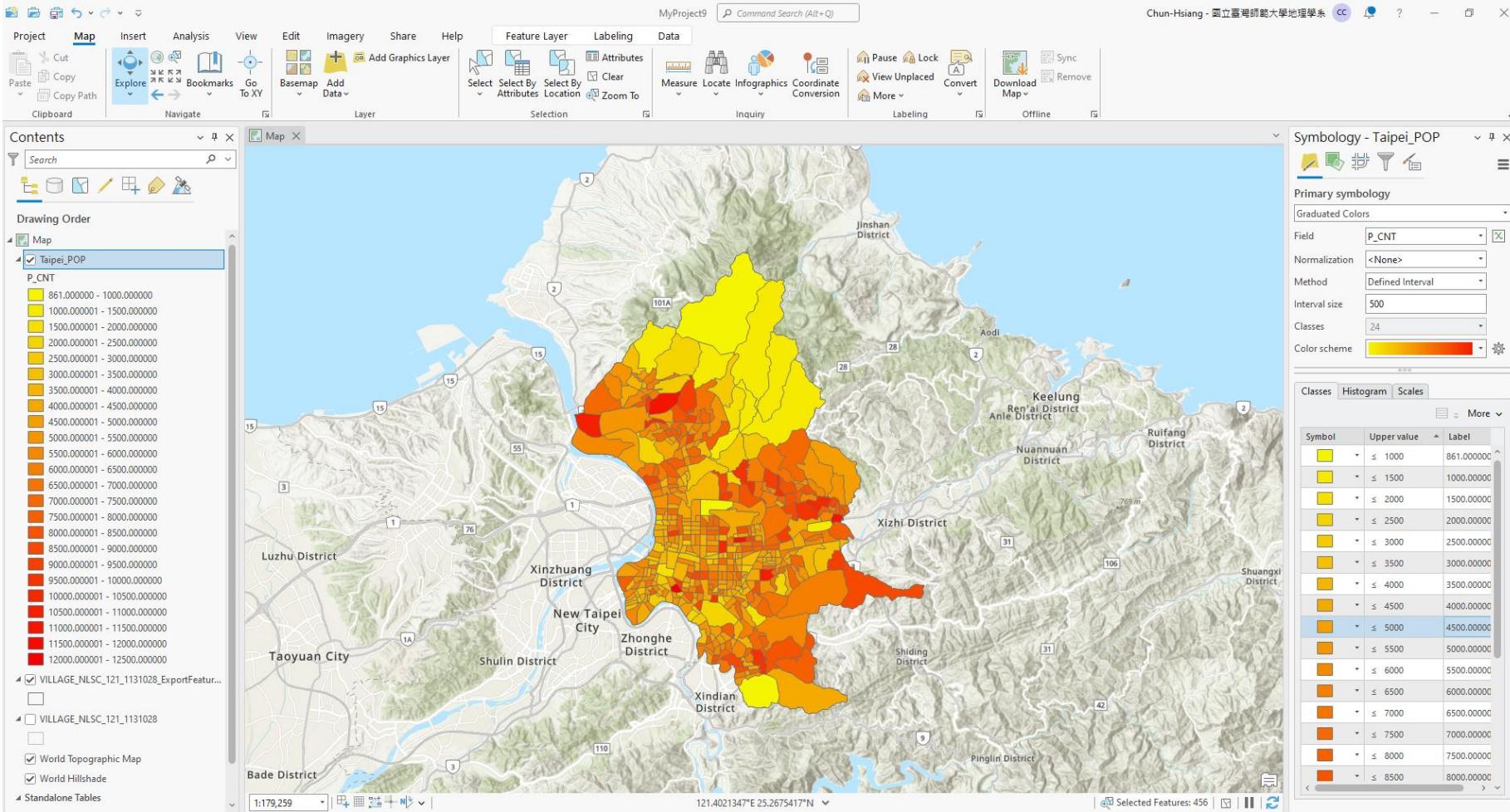
- Observe the central tendency of Taipei traffic accident data between January and July
- Observe the average nearest neighbor of Taipei traffic accident data between January and July
- Observe the spatial pattern of Taipei population data



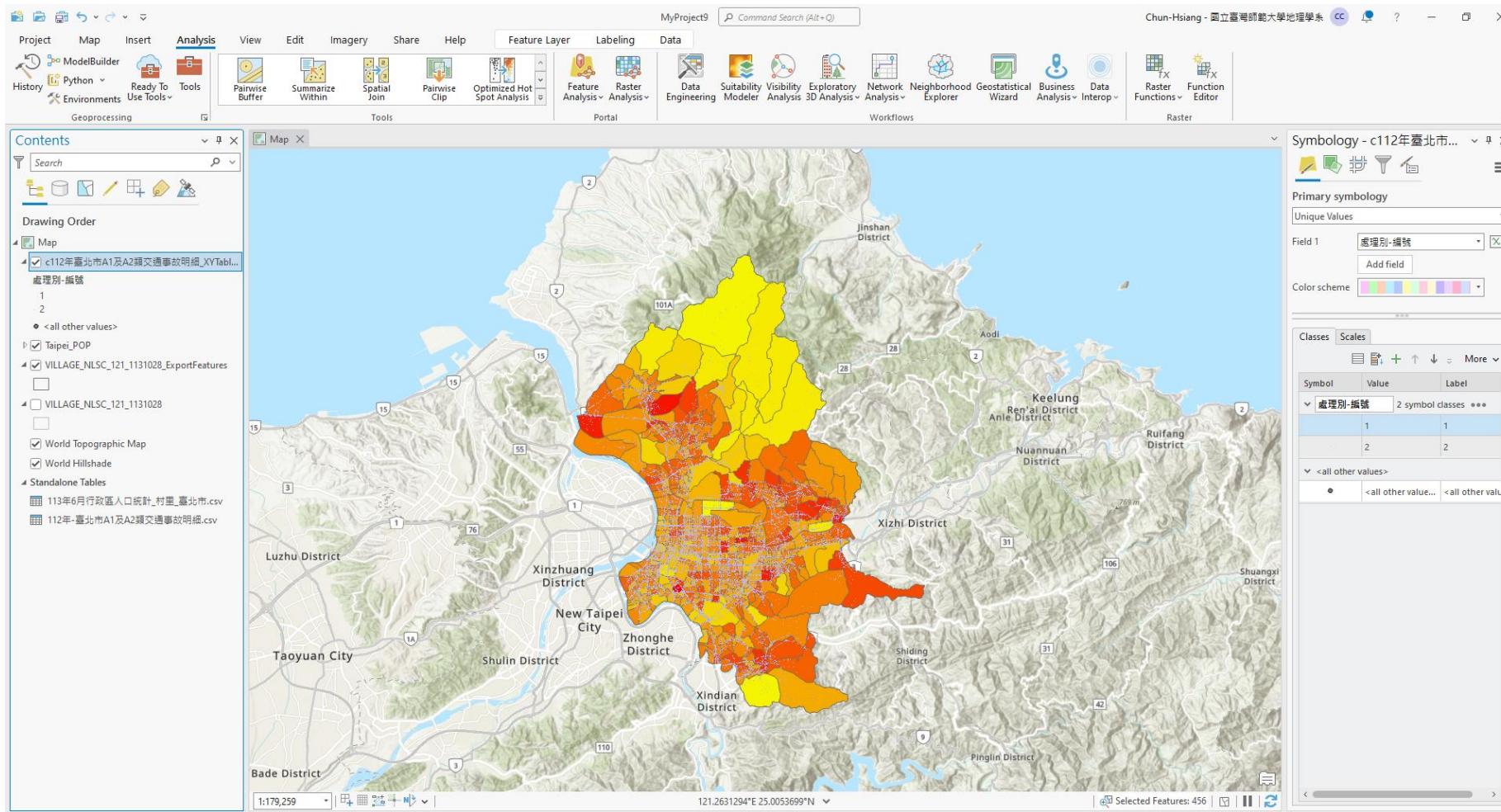
Initial Settings (...)

- 1) Set up the CRS of the map
- 2) Load Taipei Population Data, Taipei Traffic Accident Data, and Taiwan Village Data
- 3) Select all Taipei villages from the Taiwan village data and export as a new feature data named “Taipei_POP”
- 4) Join Taipei population into Taipei_POP
- 5) Use XY Table To Point to convert Taipei traffic accident data into Point data
- 6) Select 112/01 and 112/07 Taipei traffic accident and export as a new feature data, respectively, named “TrafficAccident_11201” and “TrafficAccident_11207”
- 7) Spatial Join Taipei traffic accident into Taipei_POP

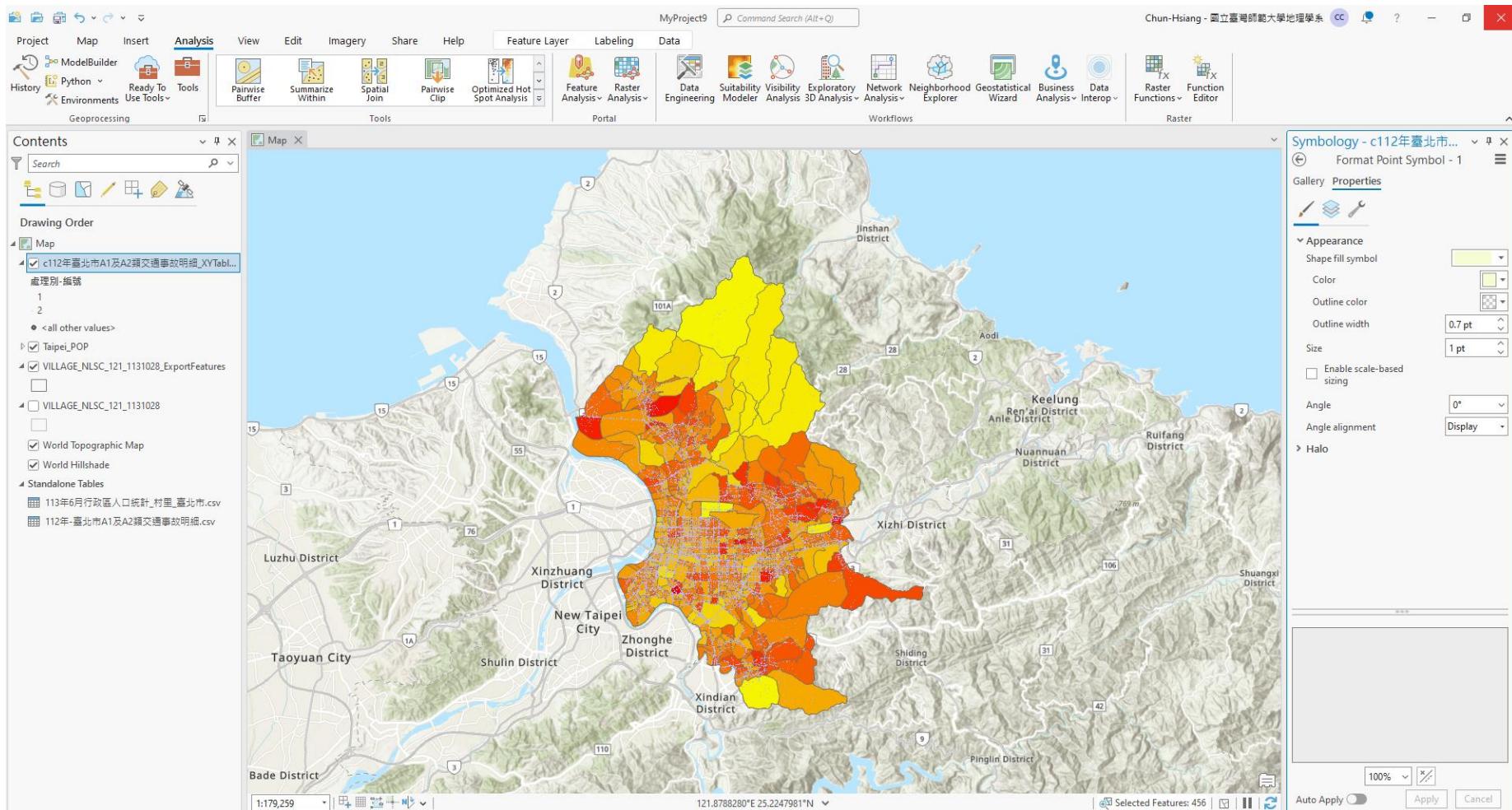
Taipei Population Data



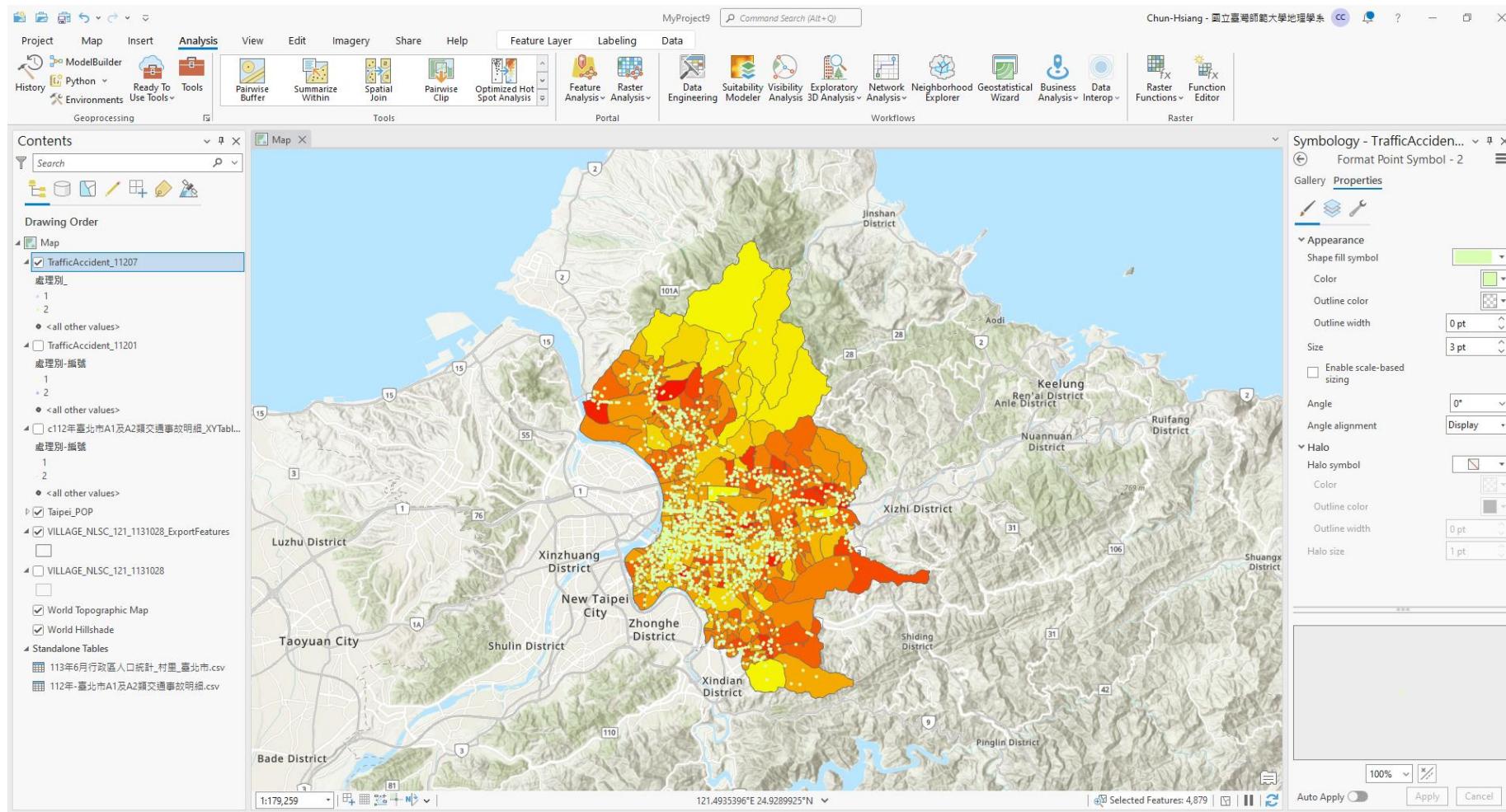
Overlay with Traffic Accident Data



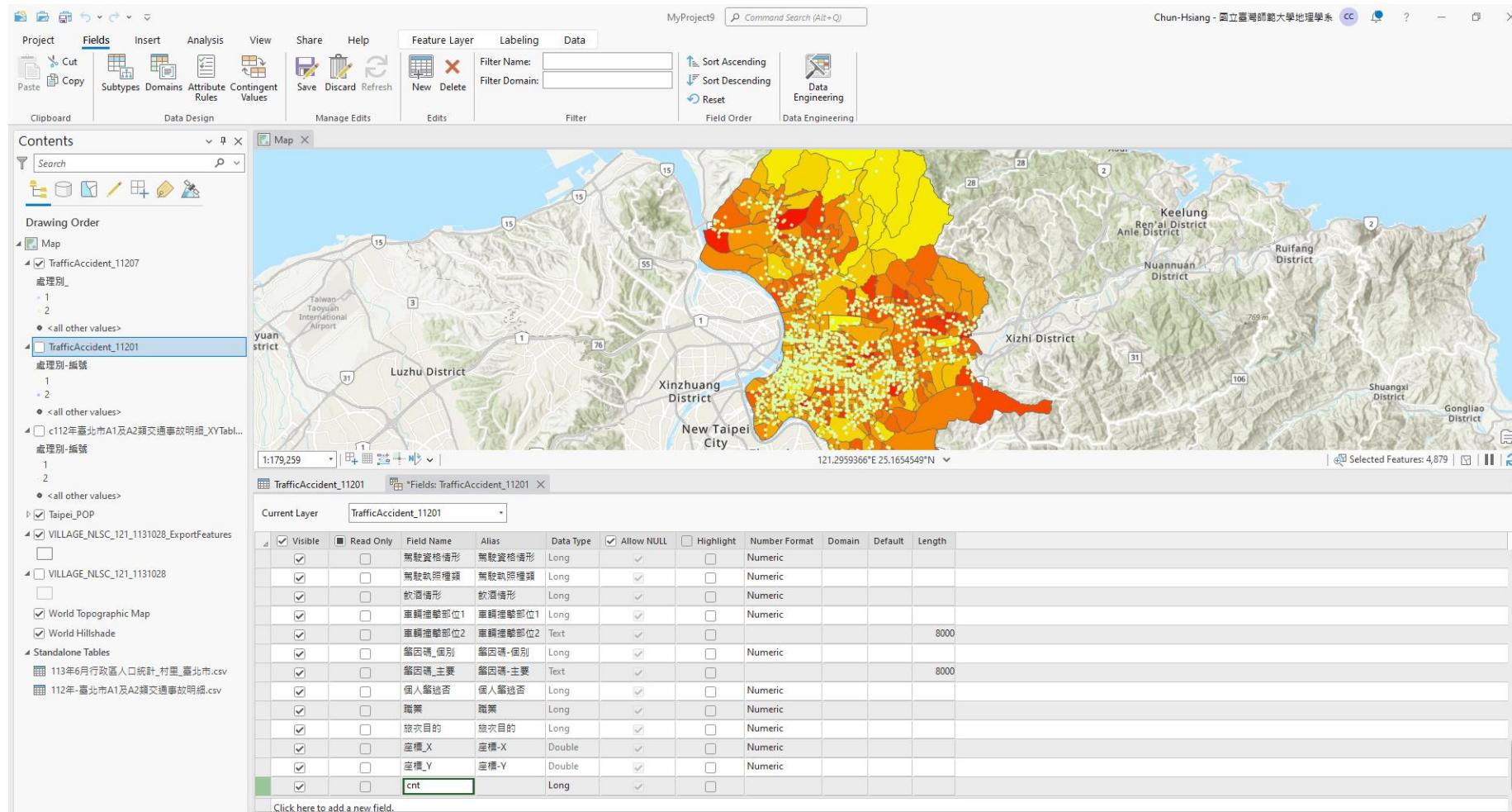
Overlay with Traffic Accident Data



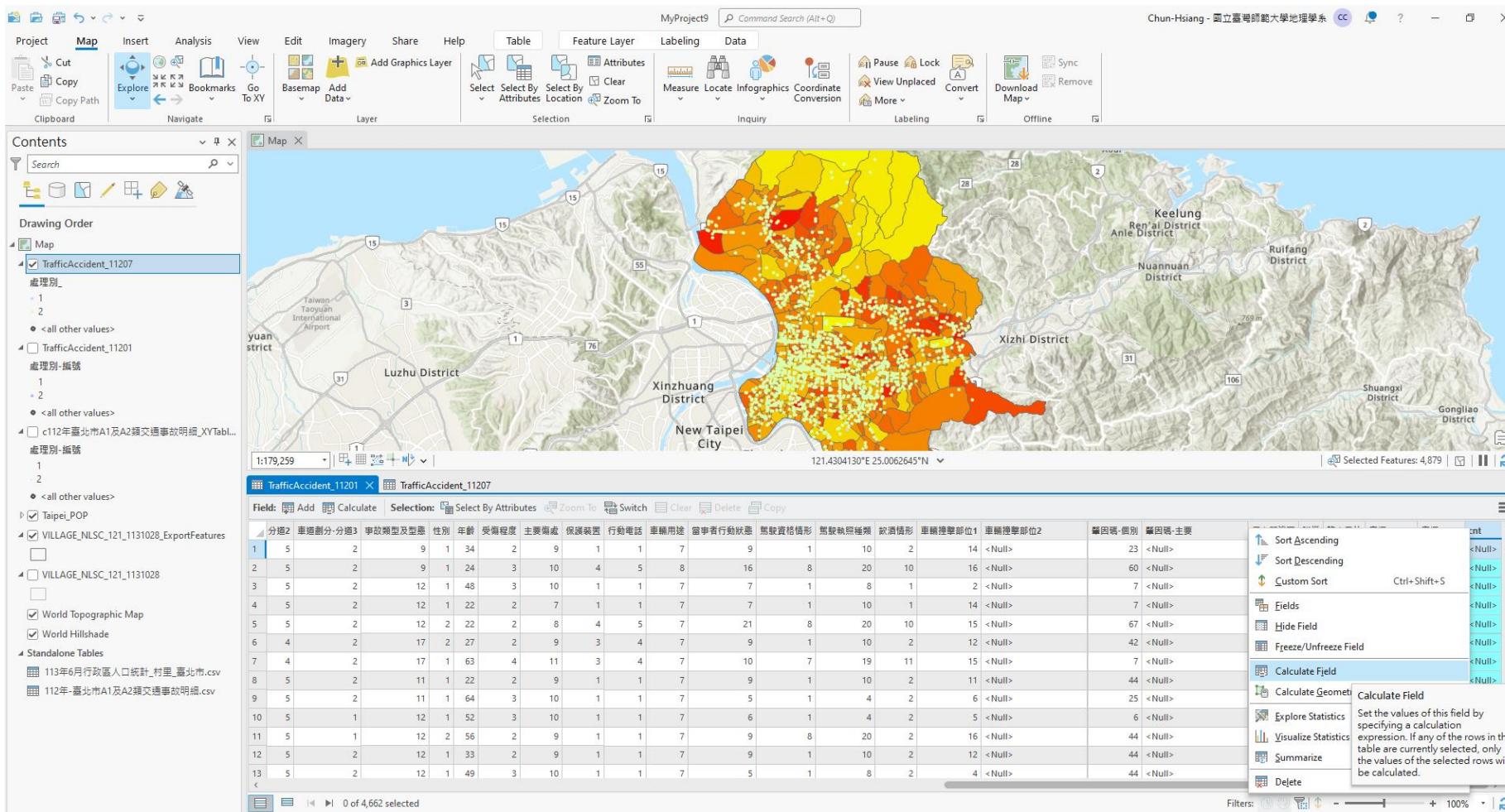
Overlay with Traffic Accident Data



Add a New Field "cnt" to both 11201 & 11207



Fill 1 into “cnt” Field to both 11201 & 11207



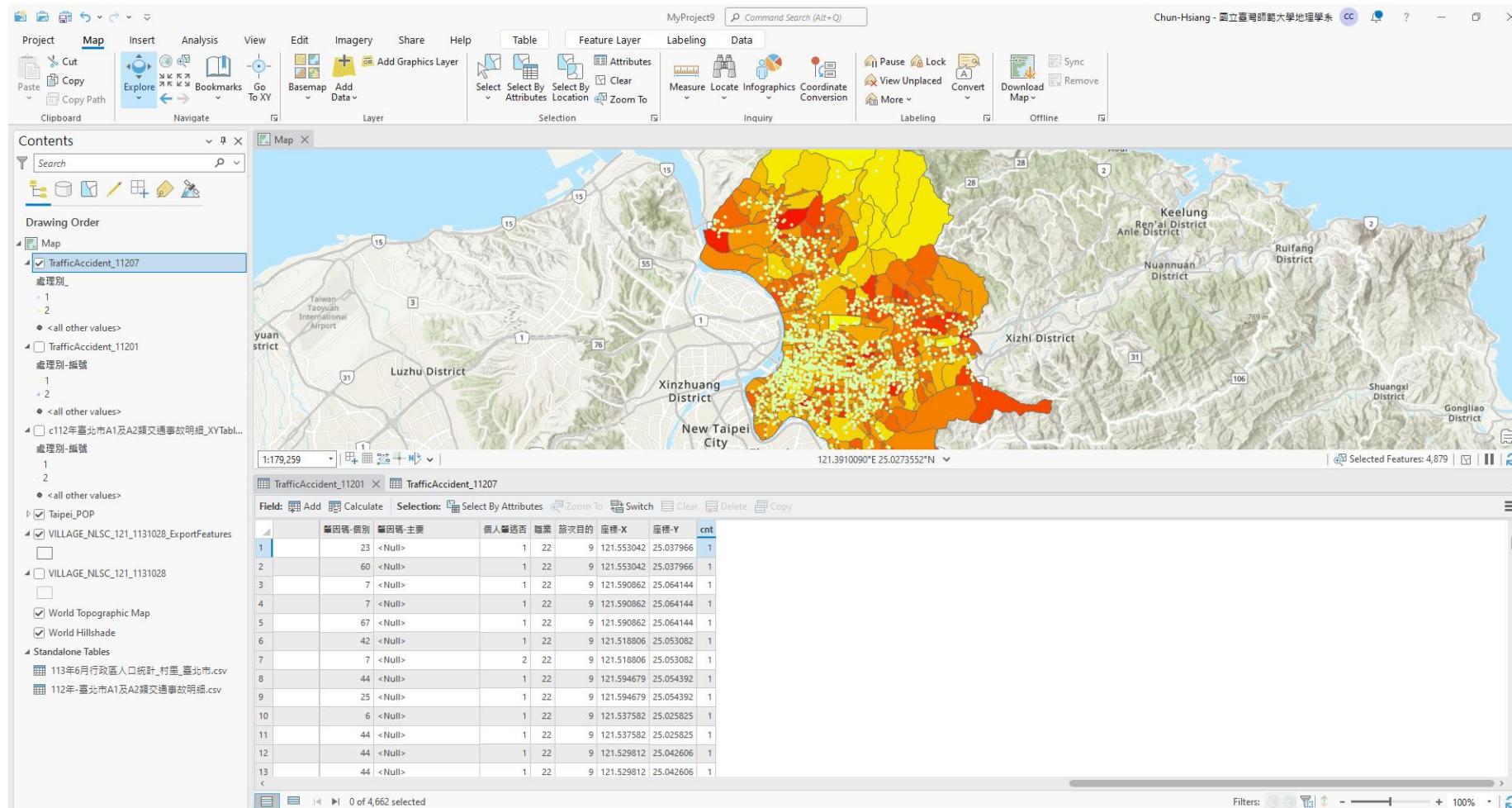
Fill 1 into “cnt” Field to both 11201 & 11207

The screenshot shows the ArcGIS Pro interface with a map of Keelung, Taiwan, displayed. The map includes various districts like Keelung, Ruifang, Nuannuan, Xizhi, Shuangxi, and Gongliao. A 'Calculate Field' dialog box is open in the foreground, overlaid on the map. The dialog box is titled 'Calculate Field' and contains the following information:

- Input Table:** TrafficAccident_11201
- Field Name (Existing or New):** cnt
- Expression Type:** Python
- Expression:** Fields pane shows:
 - as_integer_ratio()
 - .capitalize()
 - .center()
 - .conjugate()
 - .count()
 - .decode()
 - .denominator()
 - .encode()
- Insert Values:** cnt = 1

The main workspace shows a table named 'TrafficAccident_11201' with 14 rows of data. The columns include: 車輛撞擊部位1, 車輛撞擊部位2, 轉因碼-個別, 轉因碼-主要, 個人筆逃否, 職業, 旅次目的, 座標-X, 座標-Y, and cnt. The 'cnt' column is currently empty, showing '<Null>' for all rows. The bottom right corner of the dialog box shows a preview of the data with the 'cnt' field filled with the value 1.

Fill 1 into “cnt” Field to both 11201 & 11207

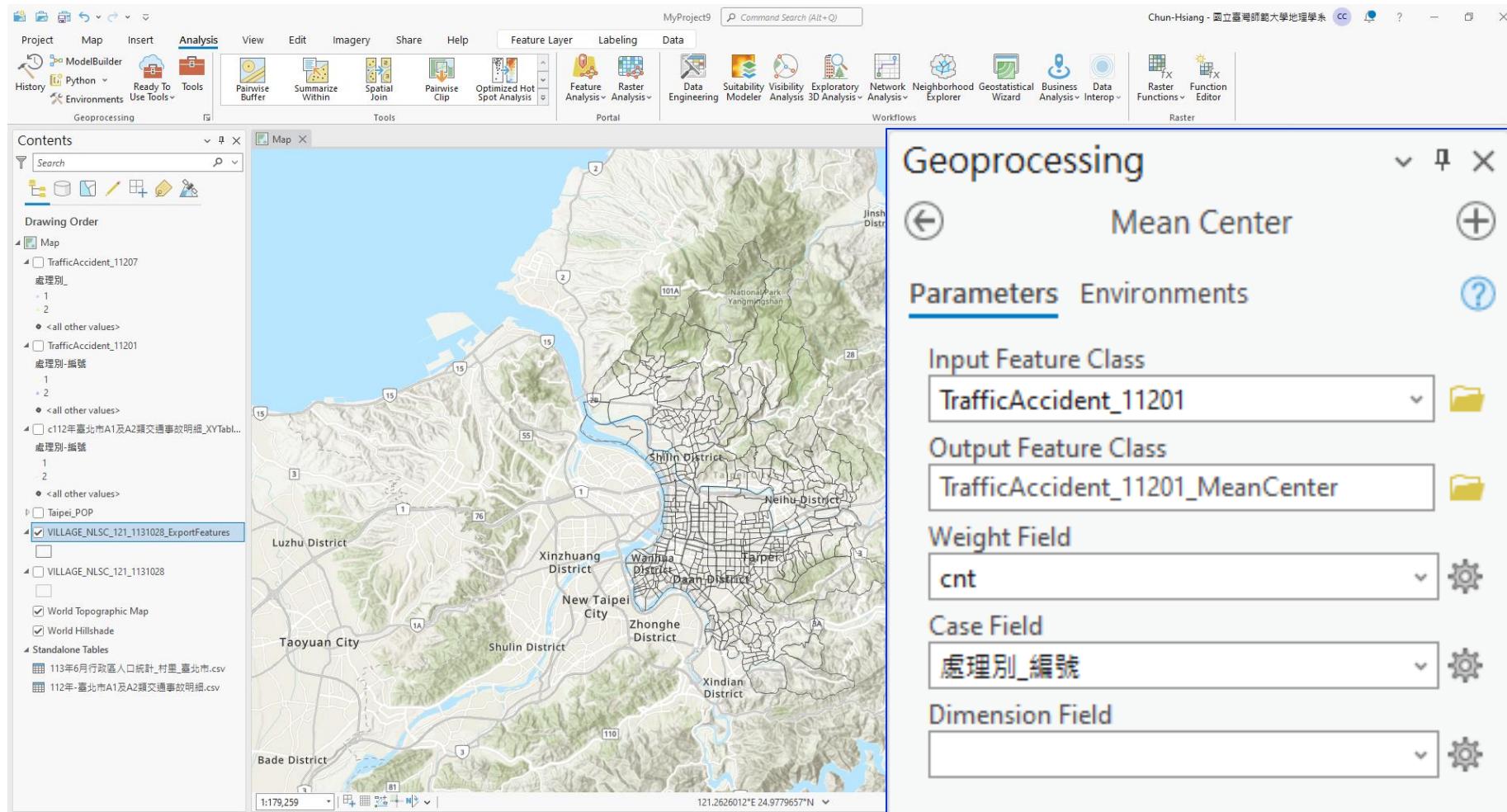


Central Tendency Analysis

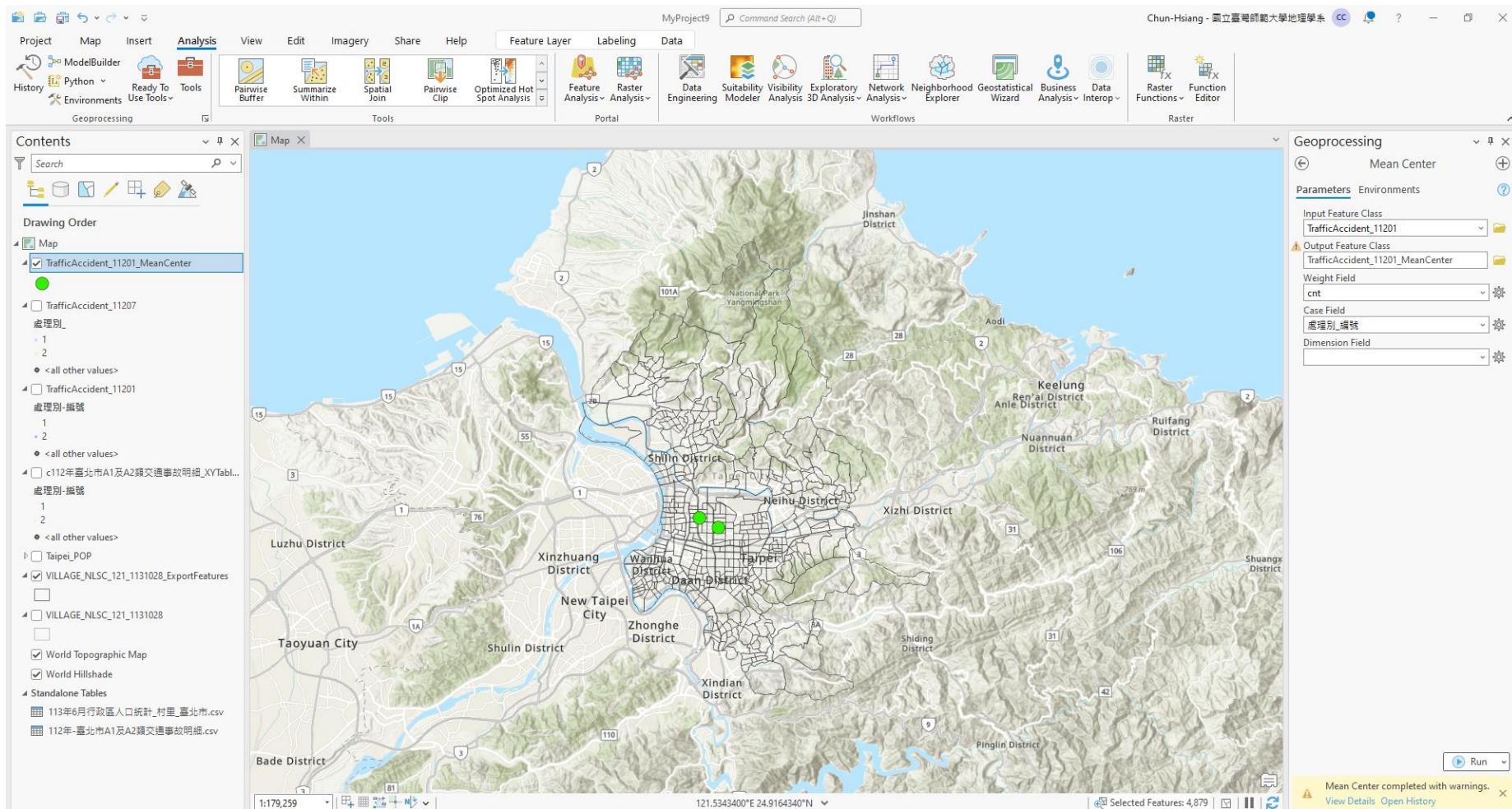
Compute the following functions with both TrafficAccident_11201 and TrafficAccident_11207

- 1) Mean Center
- 2) Median Center
- 3) Standard Distance
- 4) Central Feature
- 5) Directional Distribution

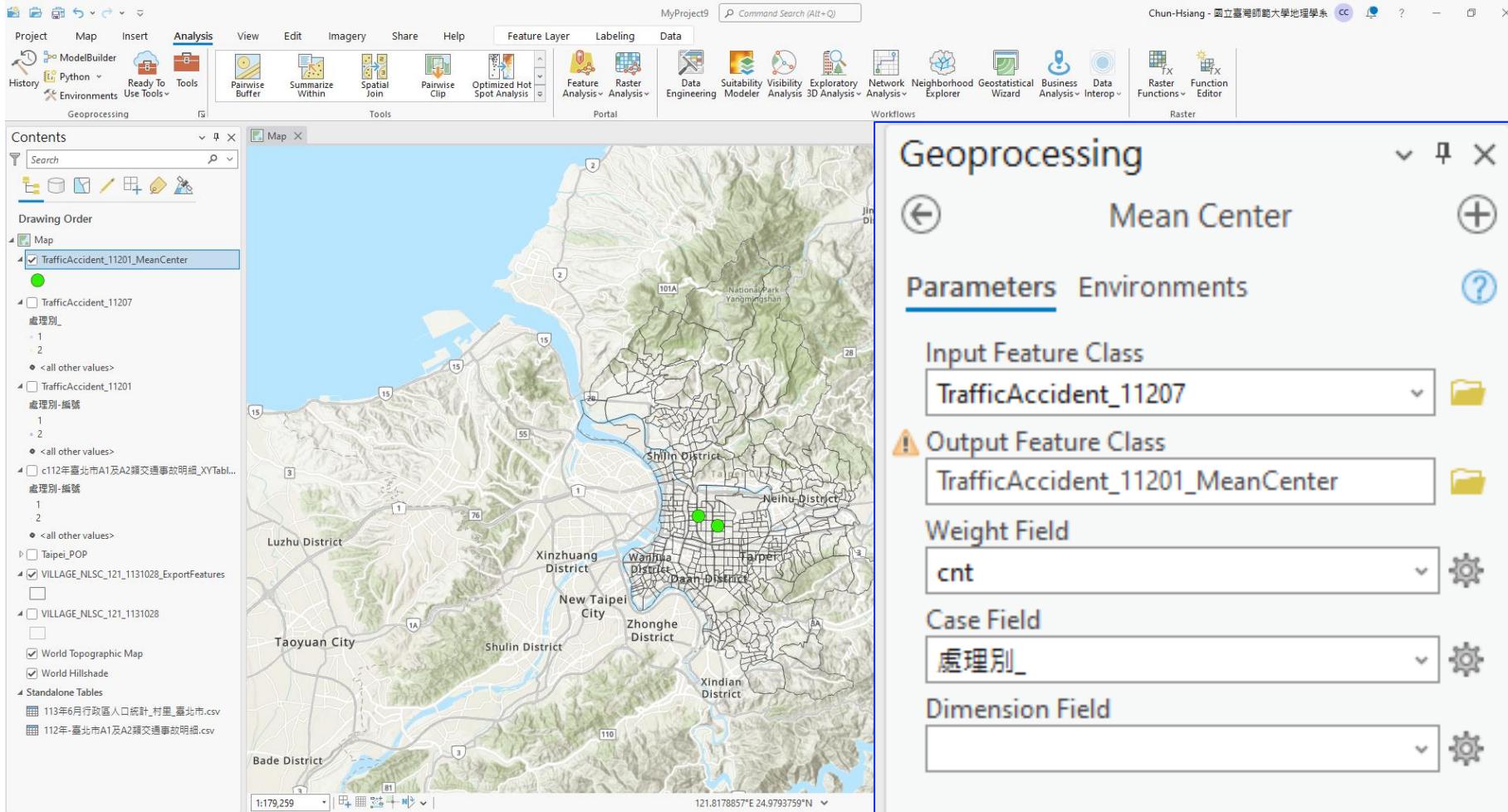
Mean Center



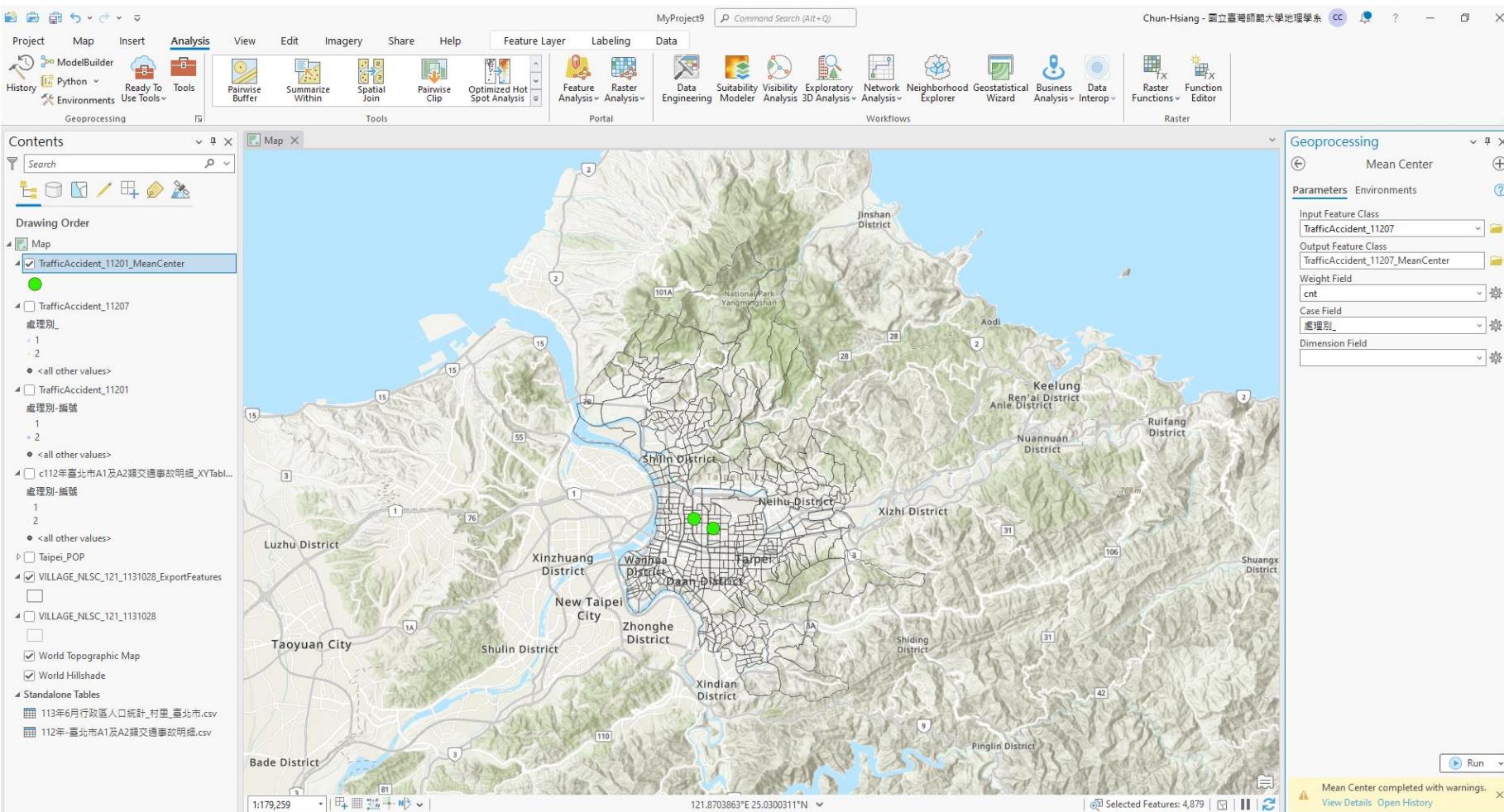
Mean Center



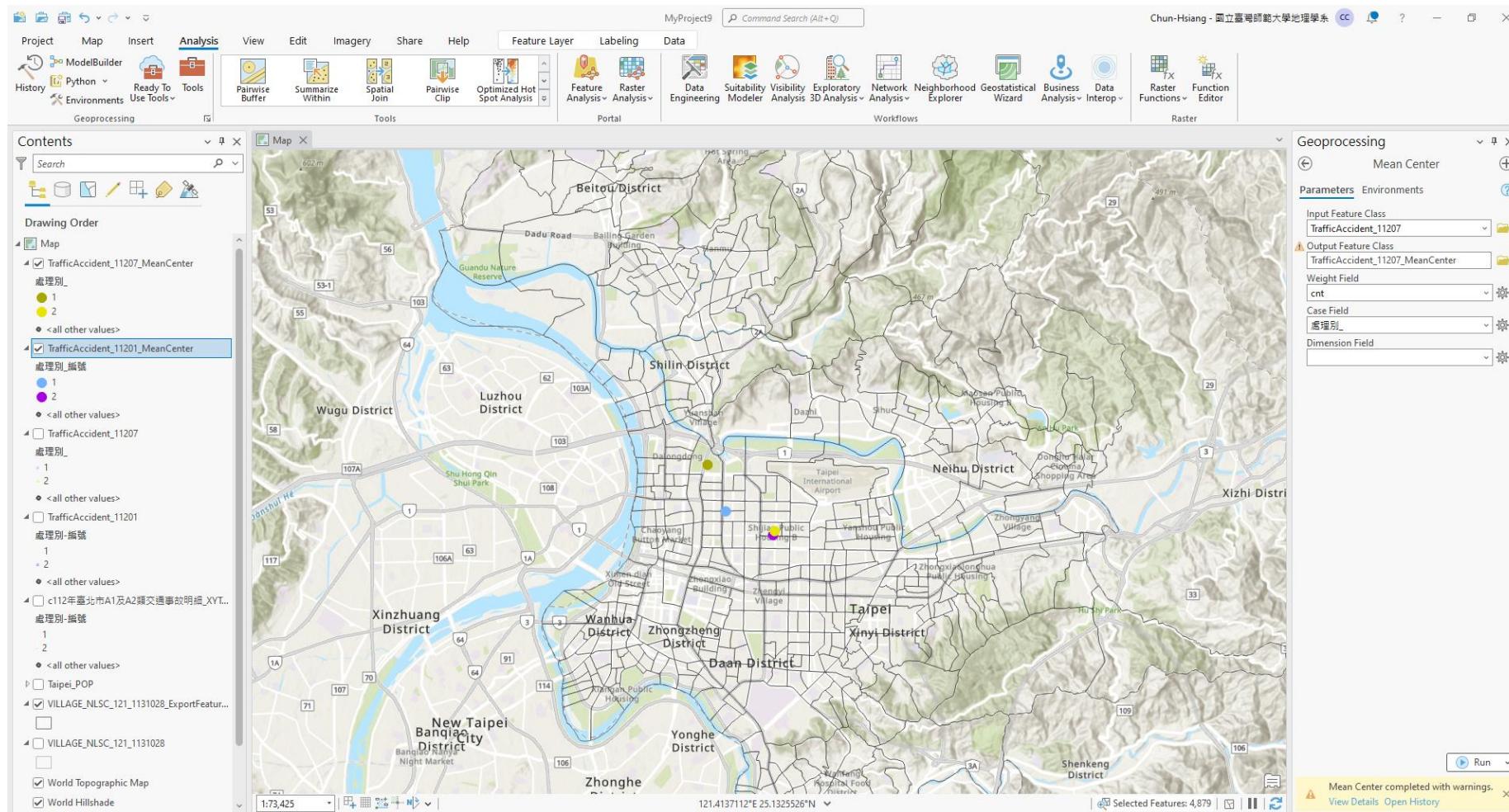
Mean Center



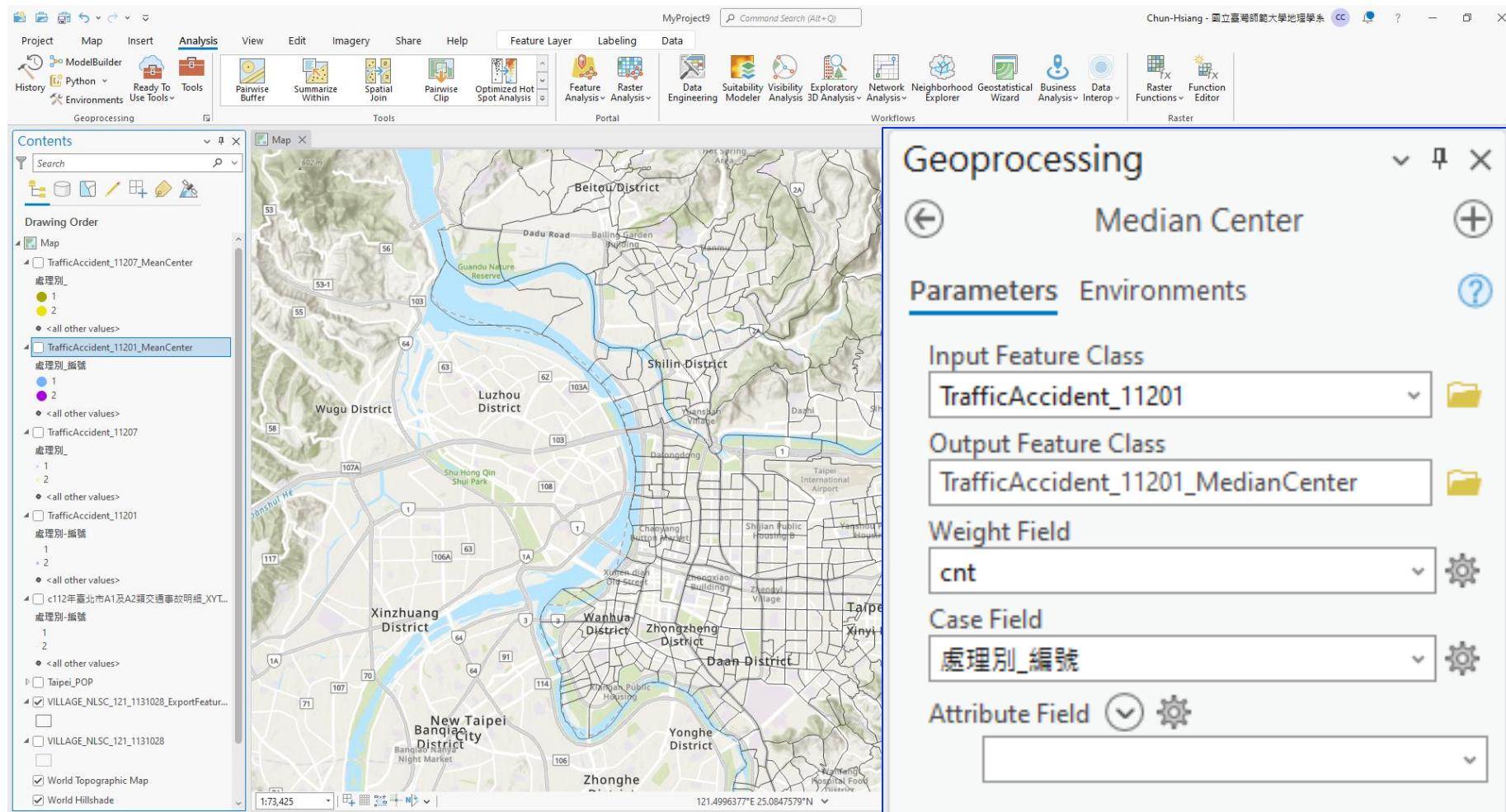
Mean Center



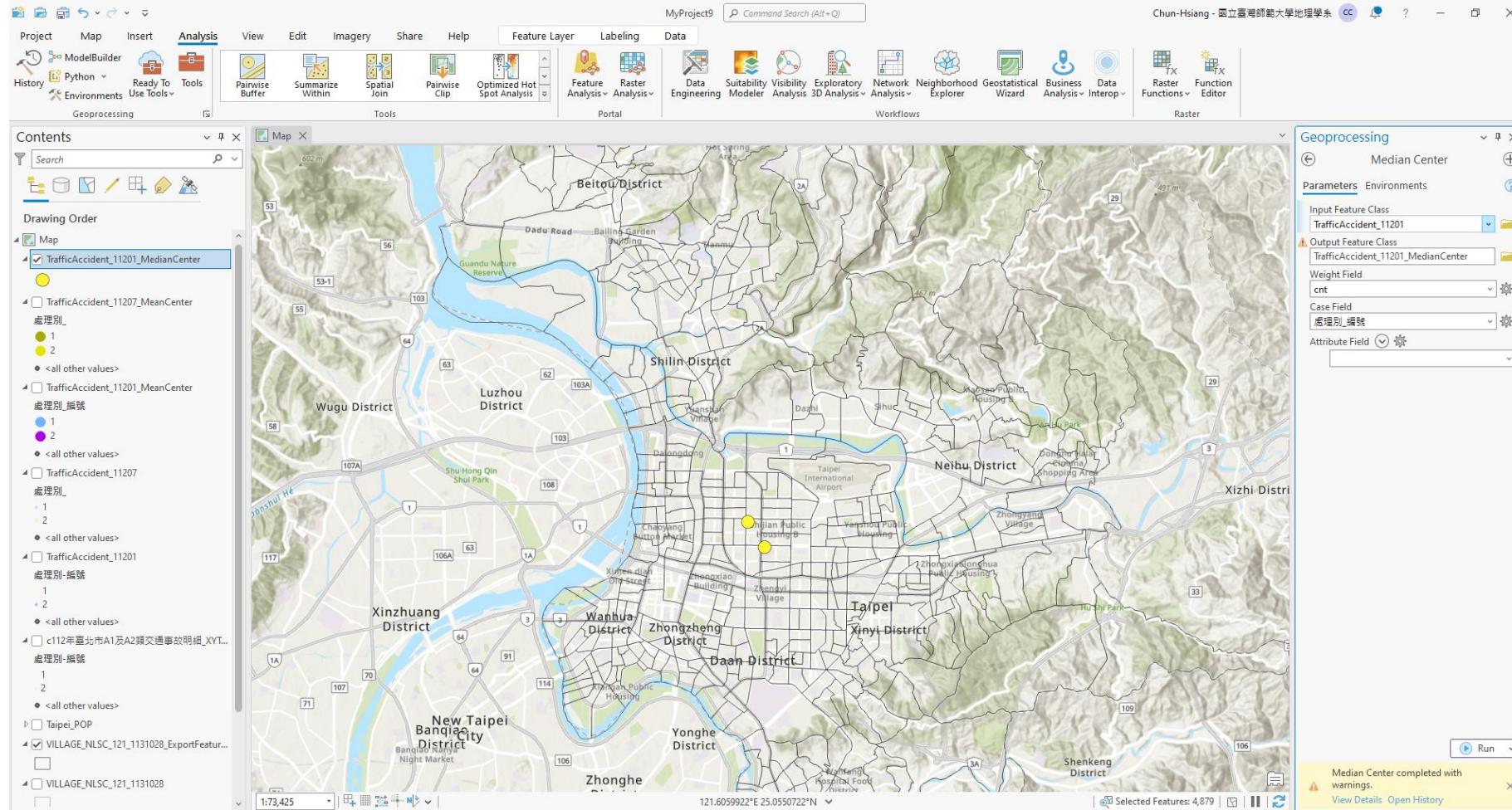
Mean Center :: Symbology



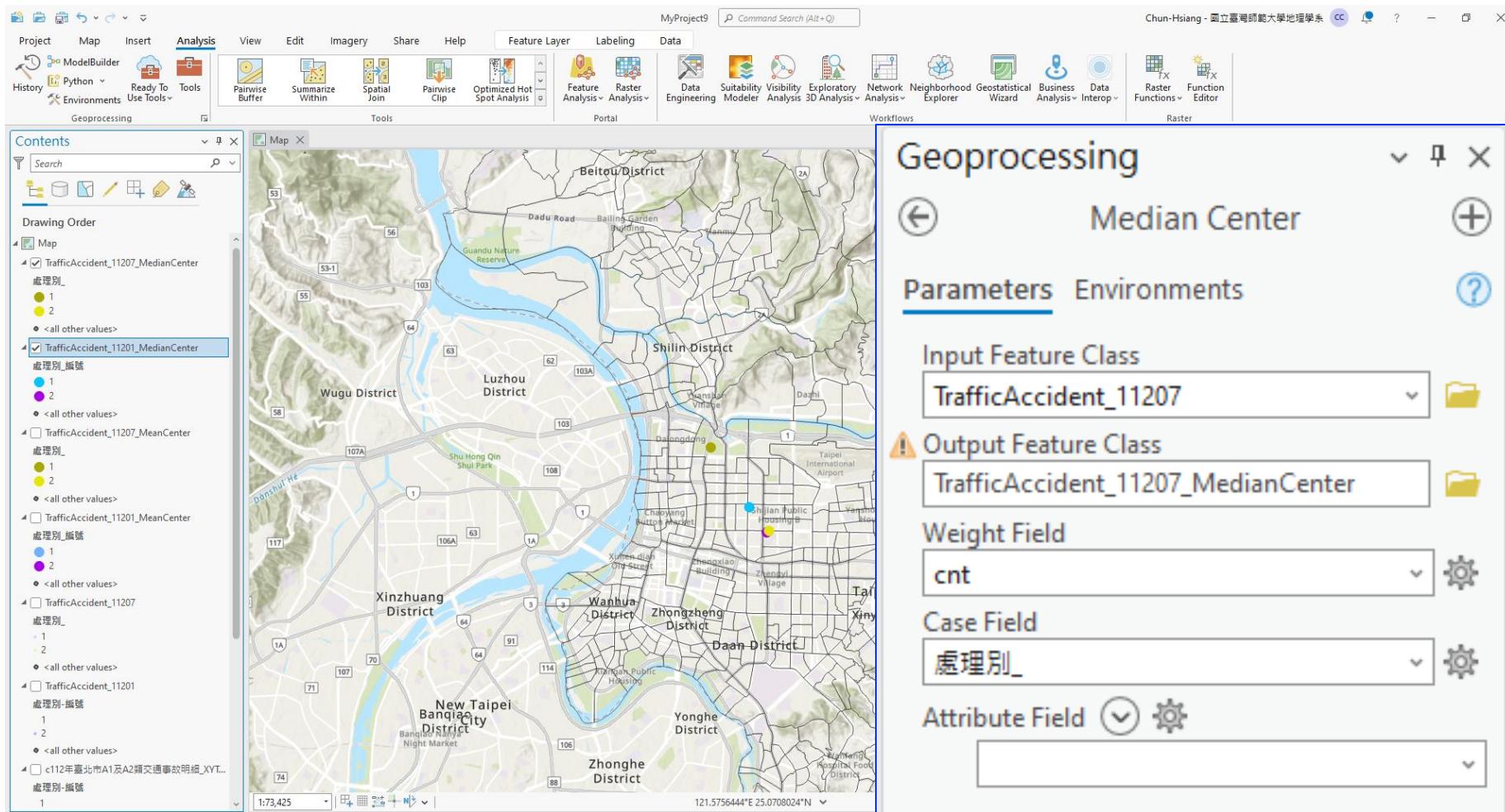
Median Center



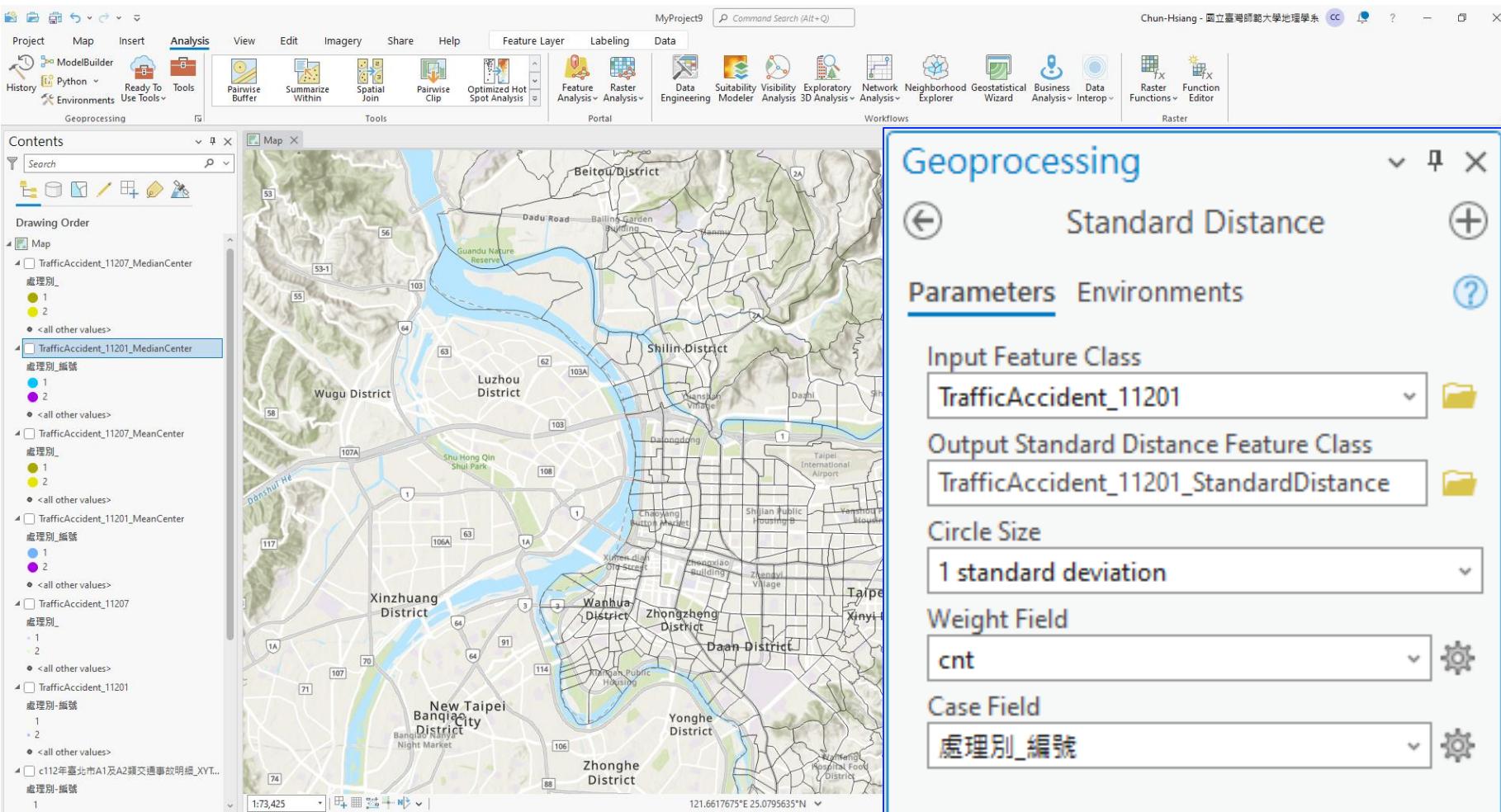
Median Center



Median Center :: Symbology



Standard Distance



Standard Distance

The screenshot shows the ArcGIS Pro interface with a map of Taipei, Taiwan, and a geoprocessing dialog box.

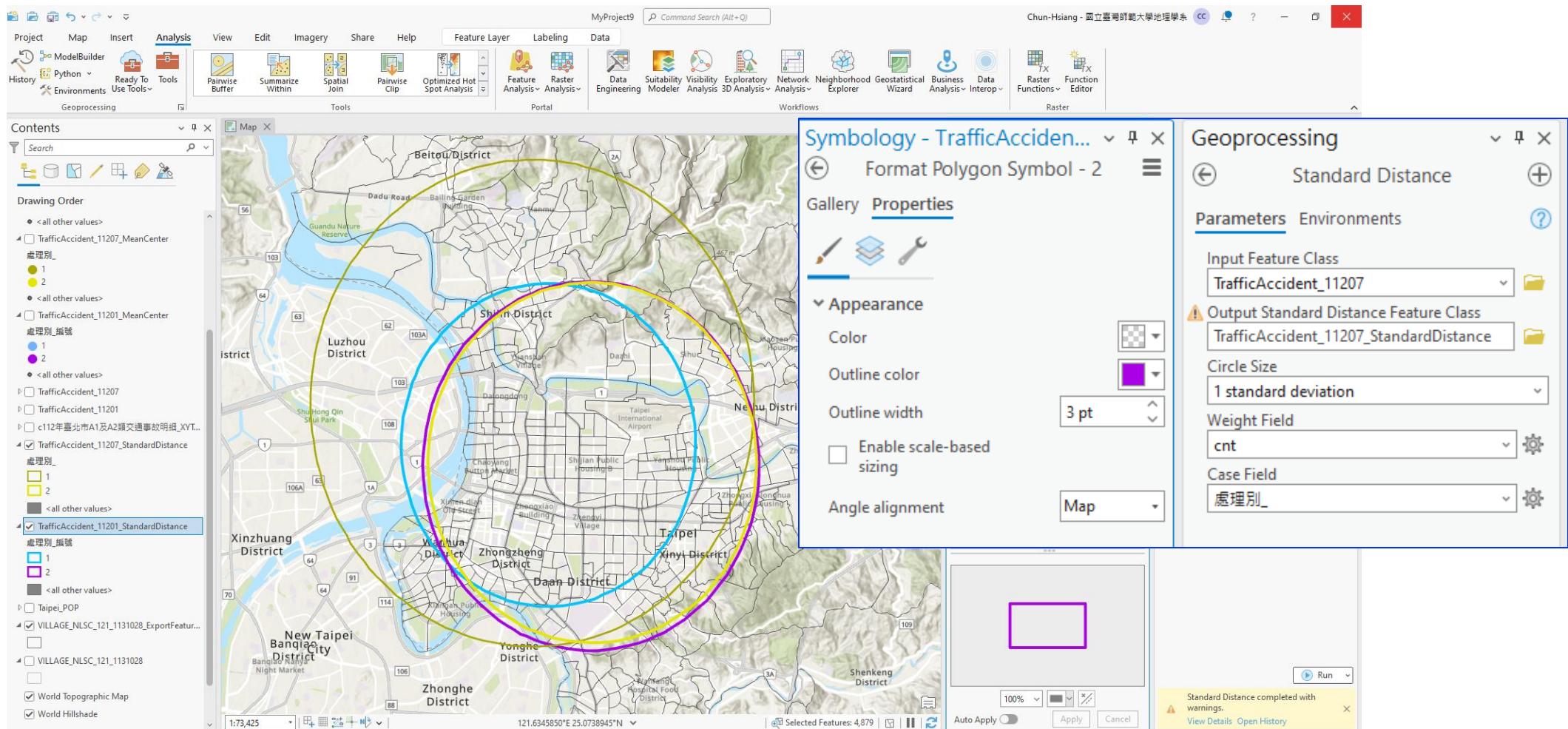
Map View: The map displays various districts of Taipei, including Beitou, Shulin, Wugu, Luzhou, Xinzhuang, New Taipei, and Daan. A purple circle is drawn around the Shulin District area. The map also shows roads, rivers, and some geographical features like Guandu Nature Reserve and Shihlin Forest.

Geoprocessing Dialog: The dialog is titled "Geoprocessing" and "Standard Distance". It has tabs for "Parameters" and "Environments".

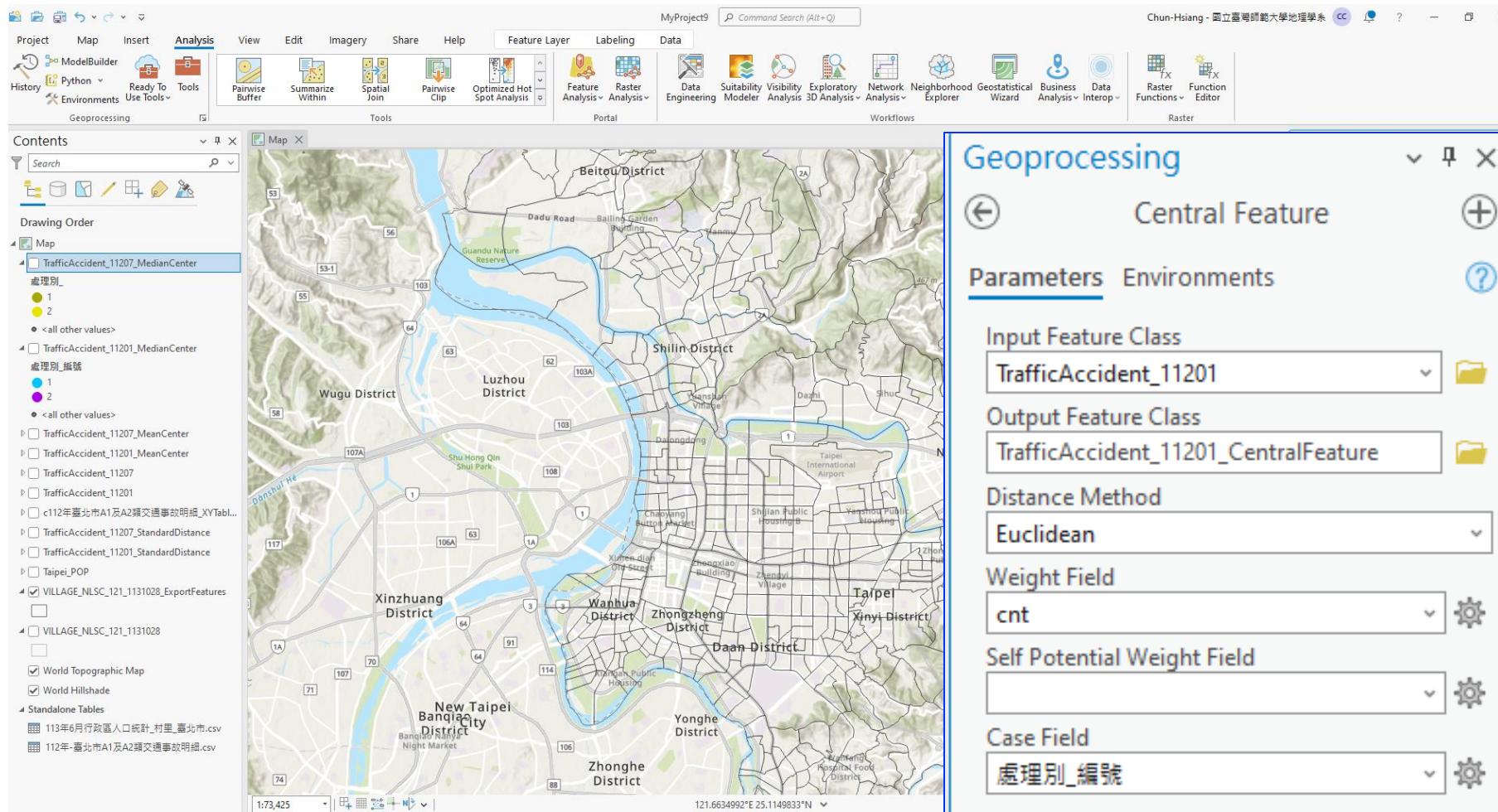
Parameters:

- Input Feature Class:** TrafficAccident_11201
- Output Standard Distance Feature Class:** TrafficAccident_11201_StandardDistance
- Circle Size:** 1 standard deviation
- Weight Field:** cnt
- Case Field:** 處理別_編號

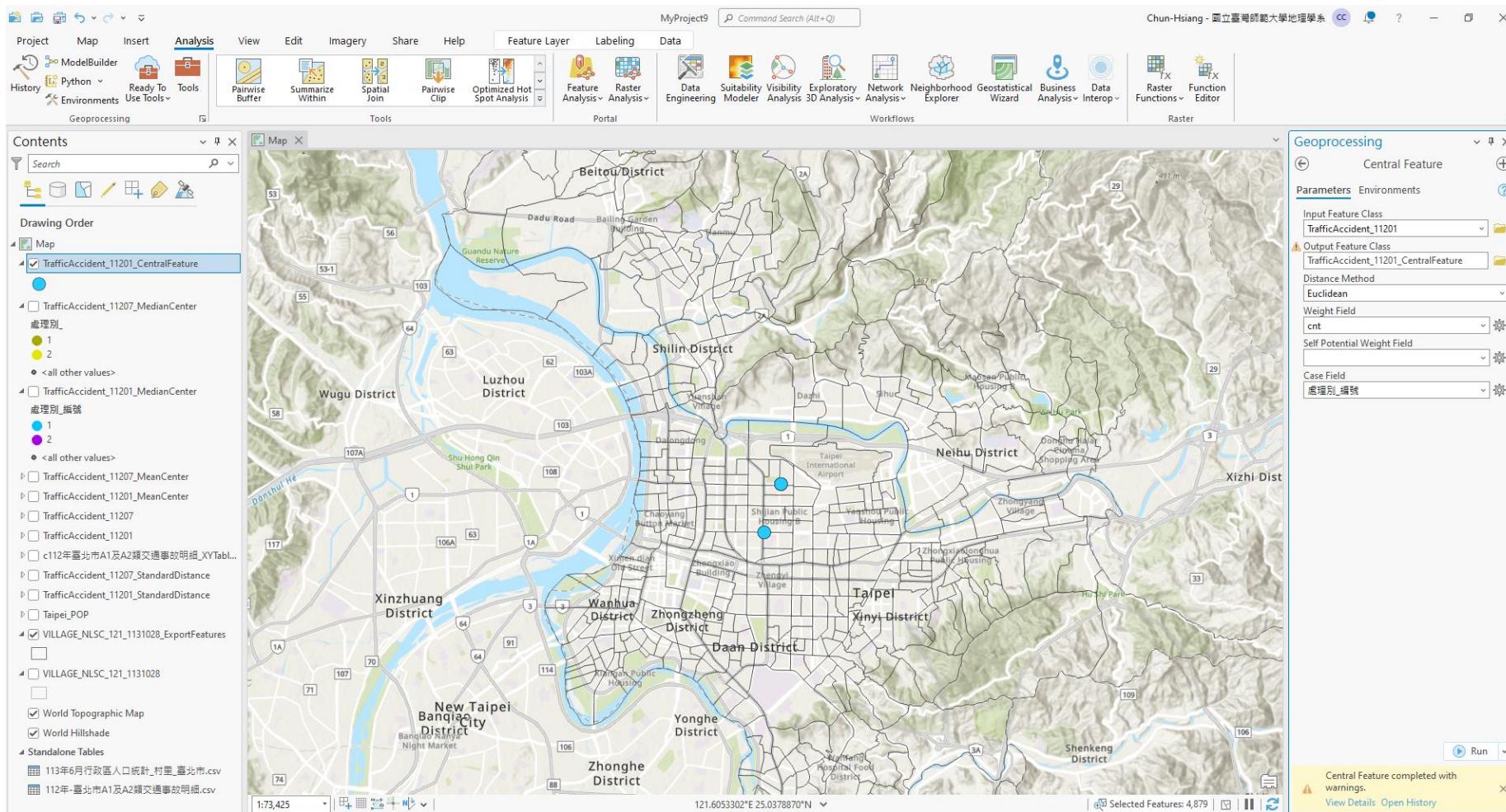
Standard Distance :: Symbology



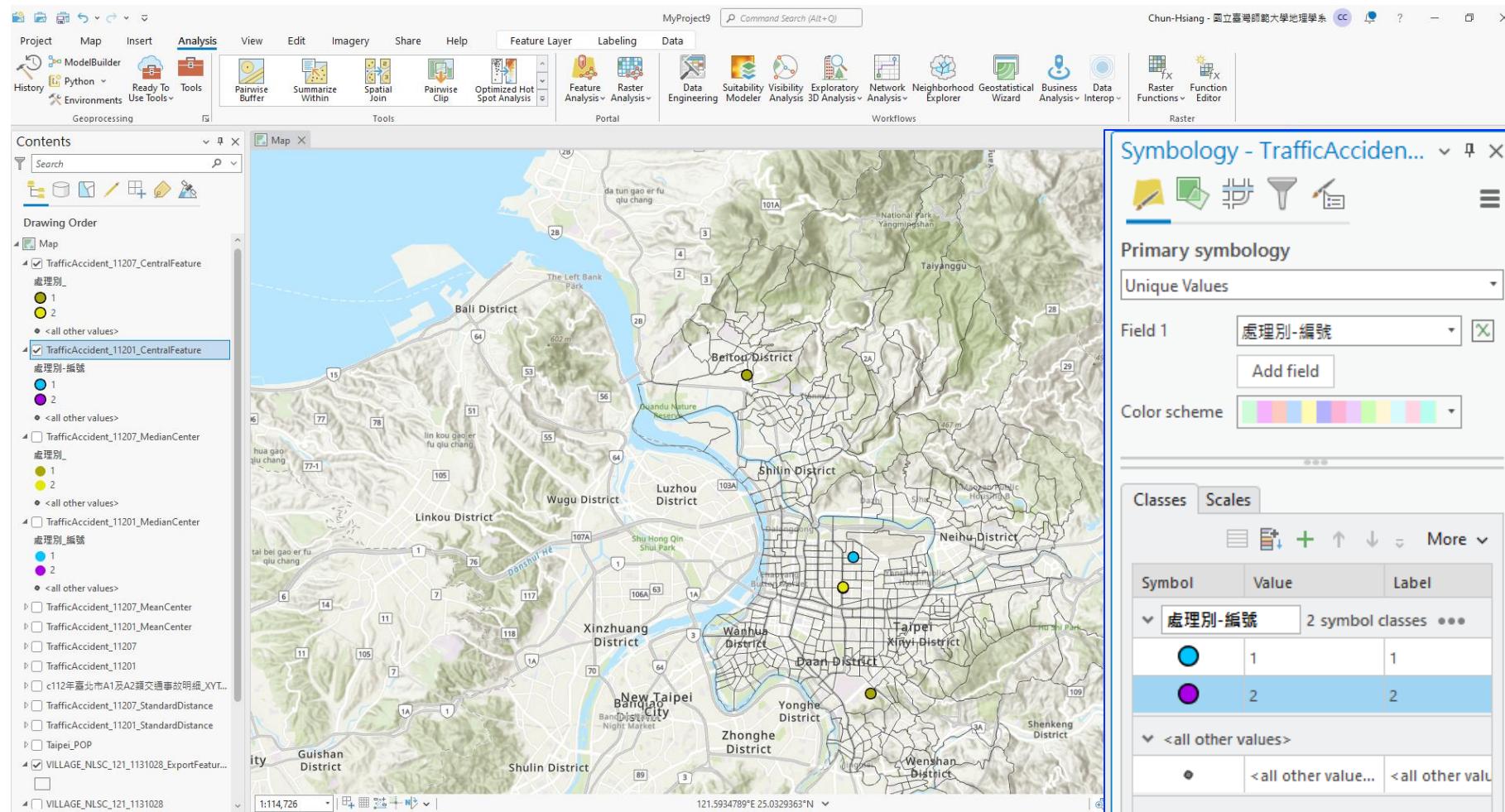
Central Feature



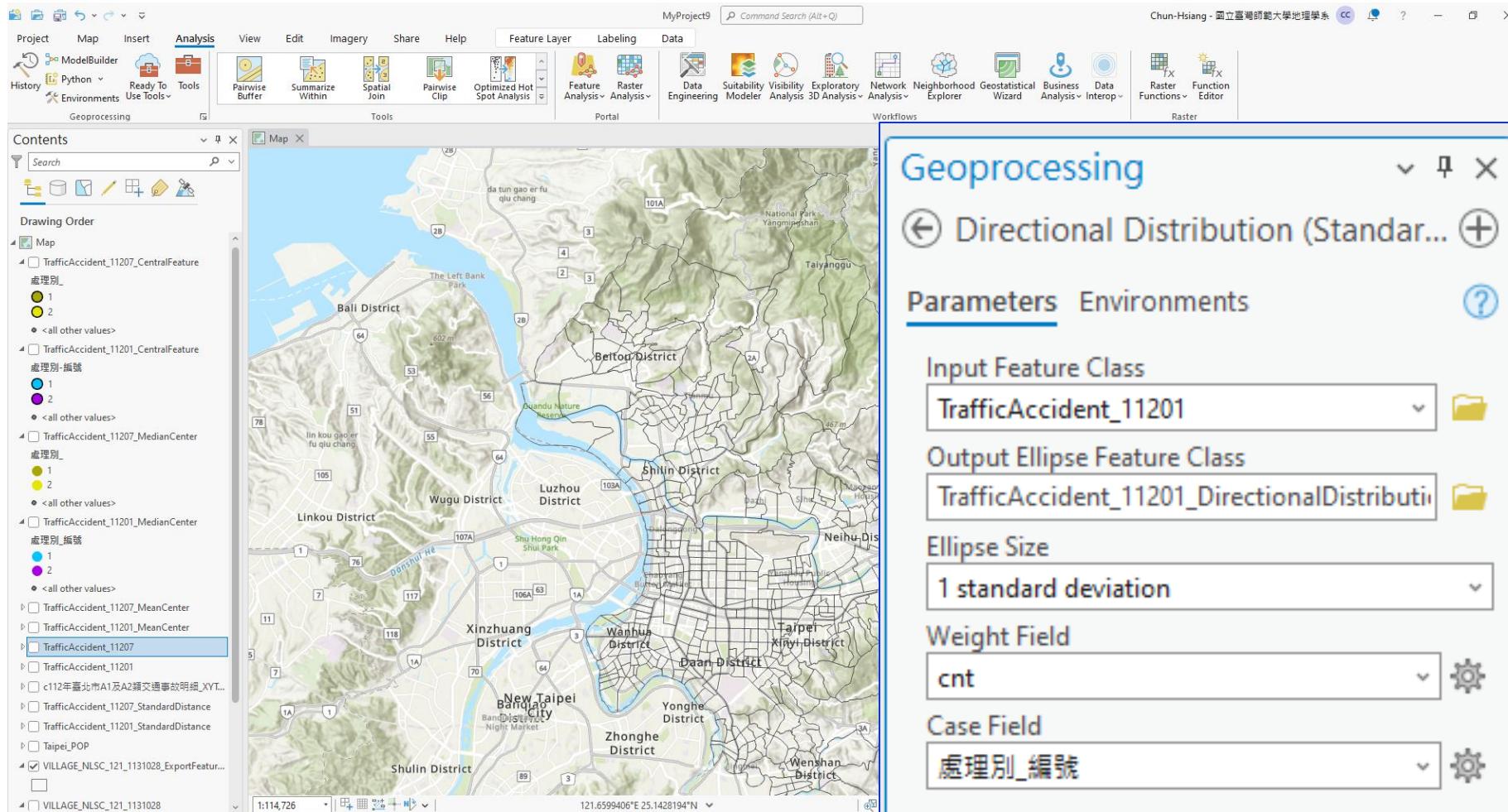
Central Feature



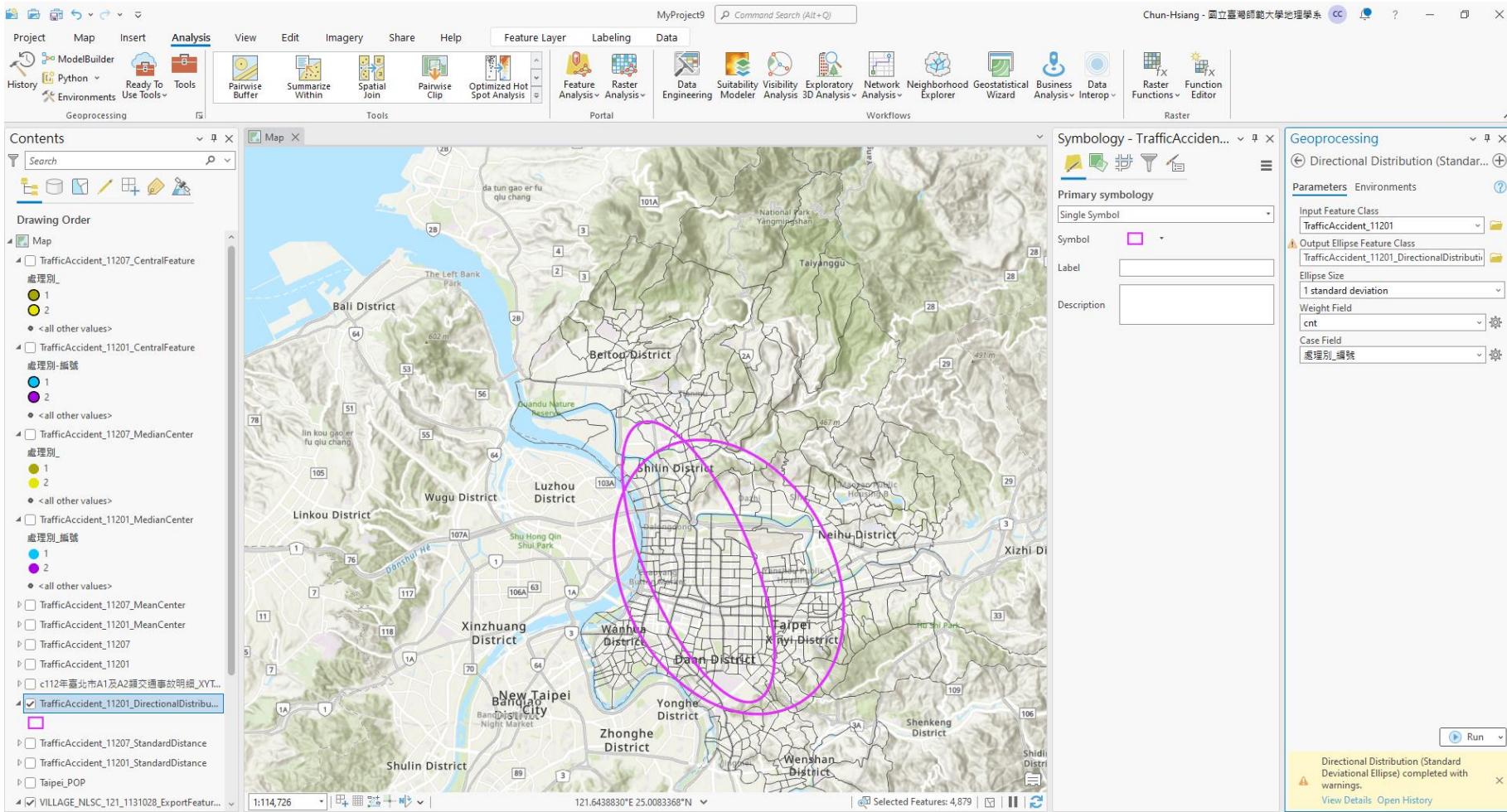
Central Feature :: Symbology



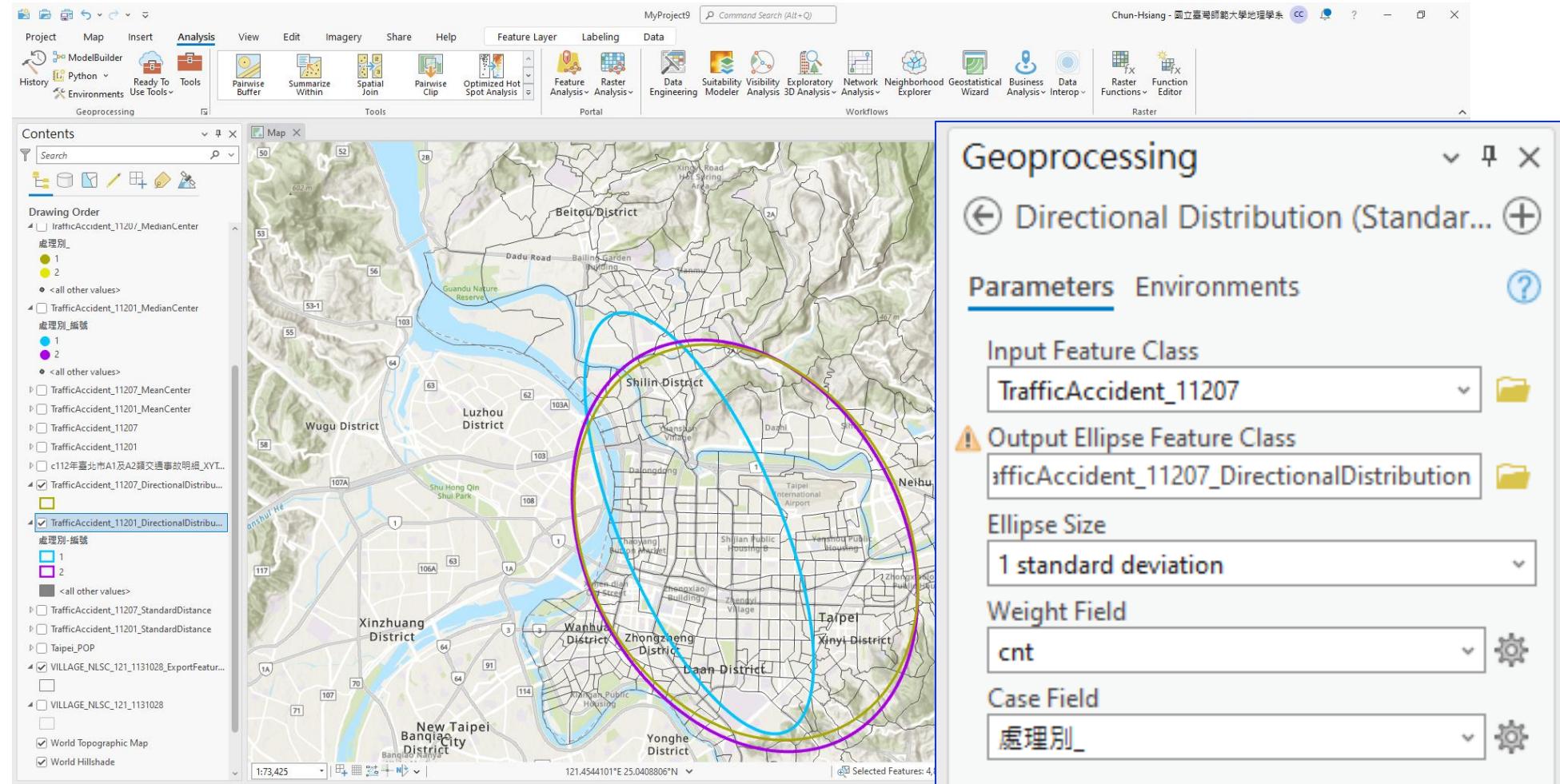
Directional Distribution



Directional Distribution



Directional Distribution :: Symbology



Spatial Statistics Analysis

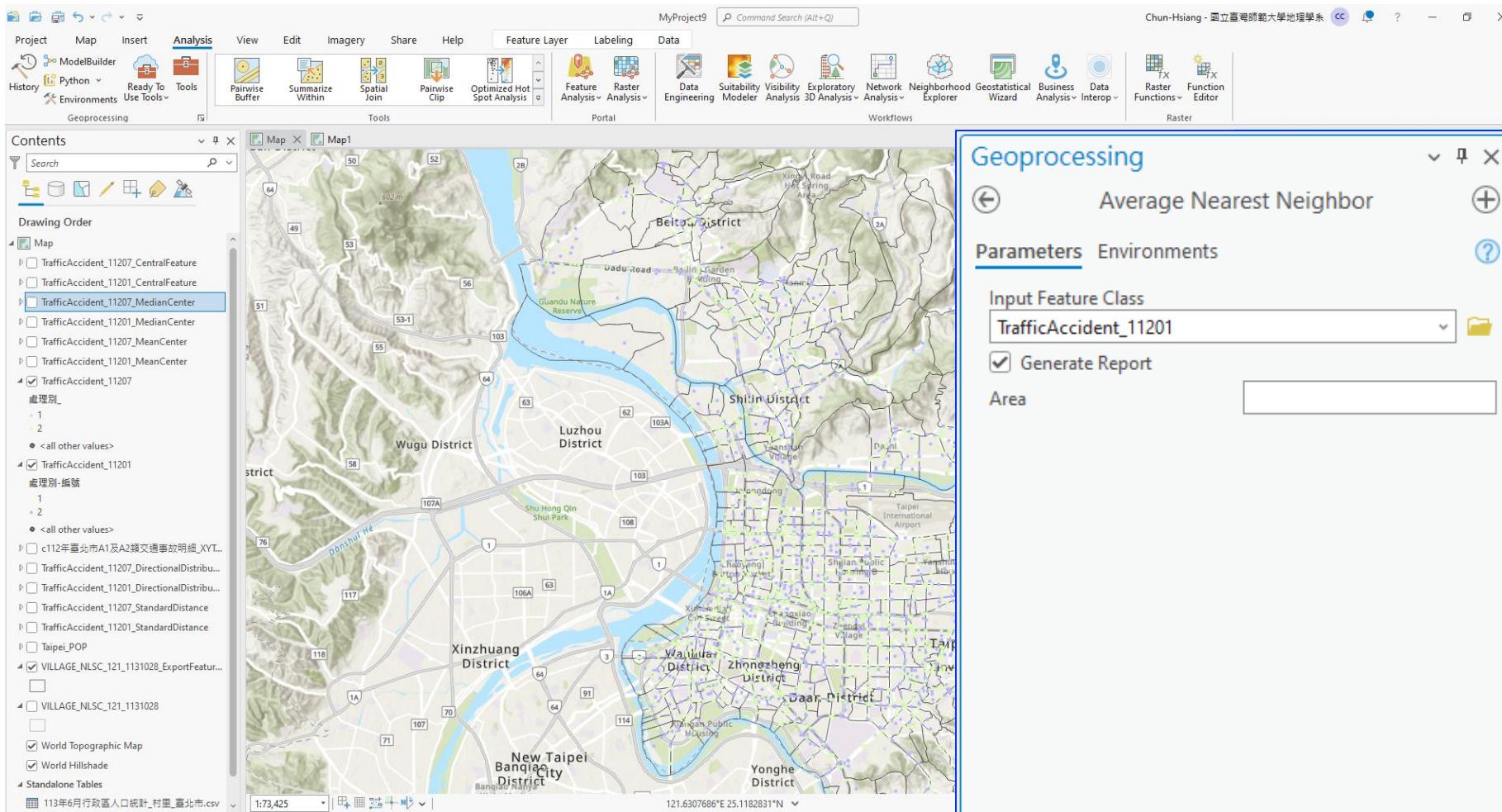
Compute the following function with both TrafficAccident_11201 and TrafficAccident_11207

- 1) Average Nearest Neighbor

Compute the following functions with the population data from Taipei POP data.

- 1) Incremental Spatial Autocorrelation
- 2) High/Low Clustering (Getis-Ord General G)
- 3) Repley's k -function
- 4) Spatial Autocorrelation (Global Moran's I)

Average Nearest Neighbor



Average Nearest Neighbor

The screenshot displays the ArcGIS Pro interface with the 'Analysis' tab selected. A central window shows the results of the 'Average Nearest Neighbor' analysis, which was completed in 1 second. The analysis summary includes:

- Started:** Today at 上午 04:08:11
- Completed:** Today at 上午 04:08:12
- Elapsed Time:** 1 Second
- WARNING 001605:** Distances for Geographic Coordinates (degrees, minutes, seconds) are analyzed using Chordal Distances in meters.

The 'Messages' section shows the same warning again. Below, the 'Average Nearest Neighbor Summary' table provides the following statistics:

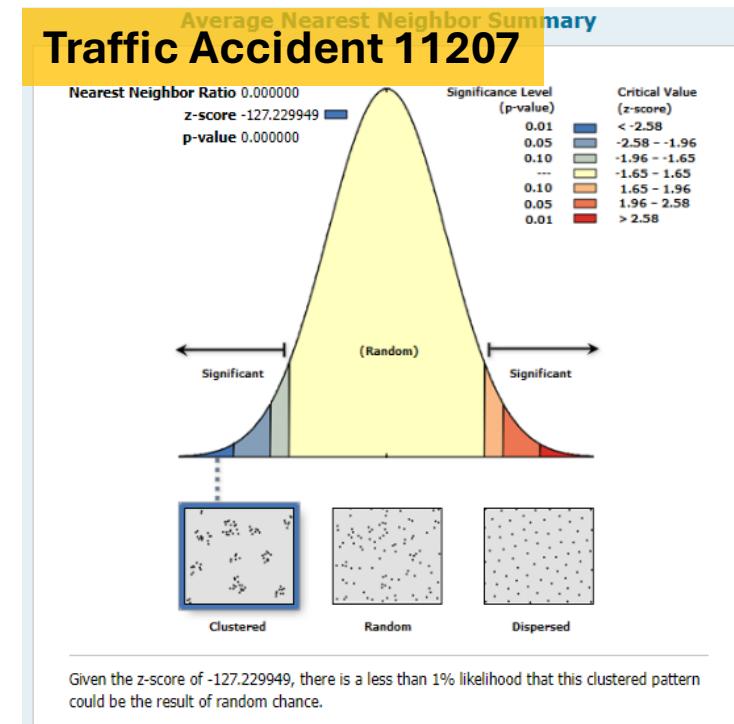
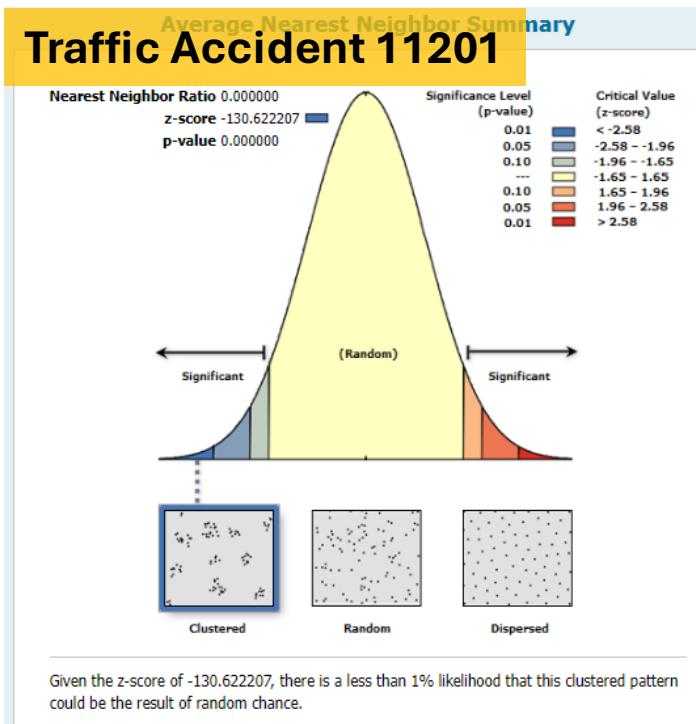
Observed Mean Distance	0.00000
Expected Mean Distance	134.911242
Nearest Neighbor Ratio	0.00000
z-score	-130.622207
p-value	0.00000

Distance measured in meters
Writing html report....
D:\TooDou\GIS\W08\MyProject9\NearestNeighbor_Result_53124_20400.html

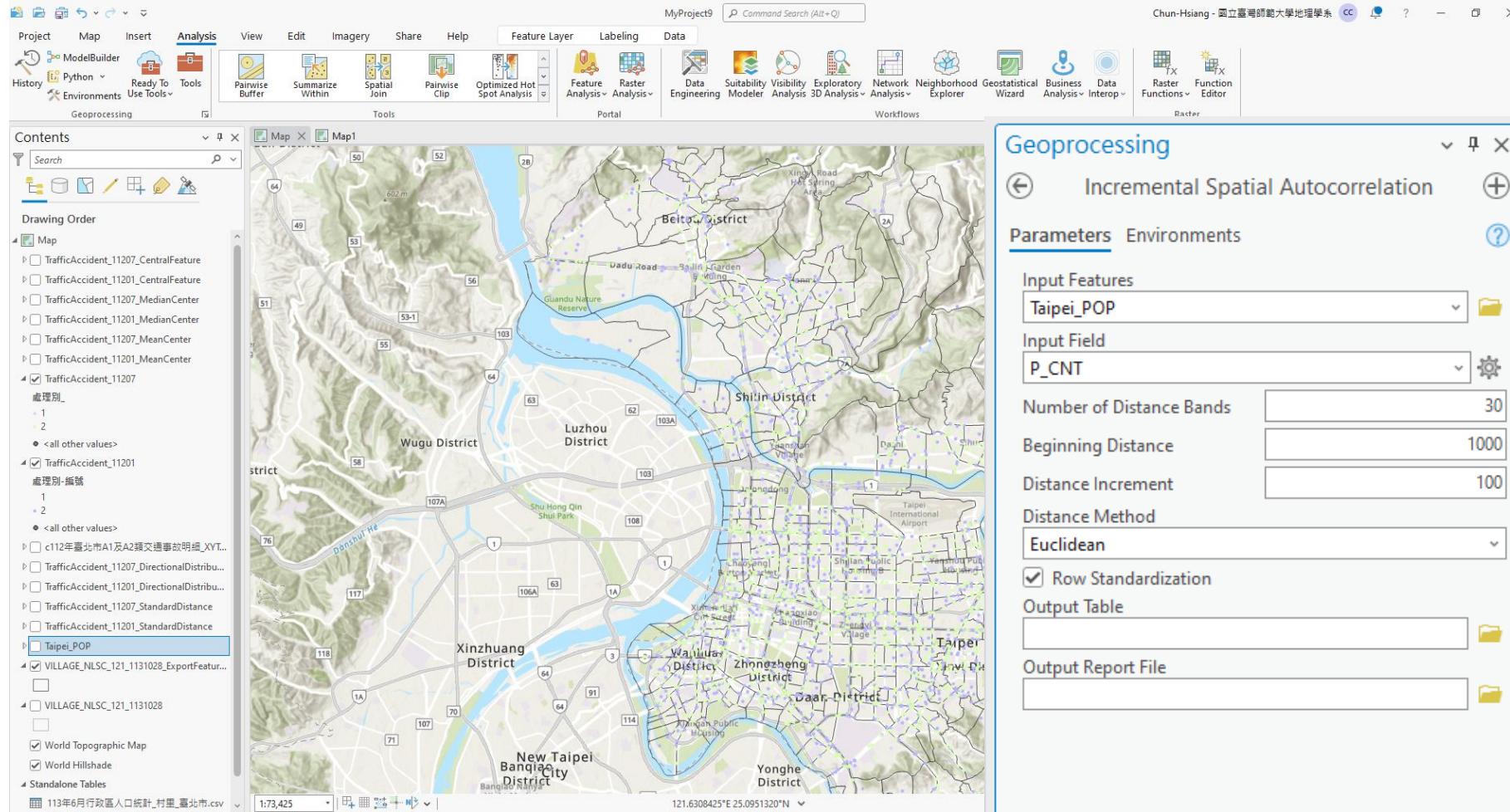
The analysis succeeded at 2024年11月13日 上午 04:08:12 (Elapsed Time: 1.79 seconds)

On the right, the 'Geoprocessing' pane shows the 'Average Nearest Neighbor' task with 'TrafficAccident_11201' selected as the input feature class. A message at the bottom indicates the analysis completed with warnings.

Average Nearest Neighbor



Incremental Spatial Autocorrelation



Incremental Spatial Autocorrelation

The screenshot shows the ArcGIS Pro interface with two floating windows displaying the results of an Incremental Spatial Autocorrelation analysis.

Left Window: Incremental Spatial Autocorrelation (Spatial Statistics Tools)

- Started: Today at 上午 04:18:37
- Completed: Today at 上午 04:18:37
- Elapsed Time: 0.55 Seconds
- Start Time: 2024年11月13日 上午 04:18:37
- Global Moran's I Summary by Distance**

Distance	Moran's Index	Expected Index	Variance	z-score	p-value
1000.00	0.156133	-0.002358	0.000587	6.540334	0.000000
1100.00	0.148698	-0.002315	0.000511	6.680377	0.000000
1200.00	0.144717	-0.002304	0.000426	7.126809	0.000000
1300.00	0.131357	-0.002288	0.000366	6.983066	0.000000
1400.00	0.144805	-0.002252	0.000362	7.730975	0.000000
1500.00	0.149426	-0.002237	0.000339	8.234156	0.000000
1600.00	0.149717	-0.002232	0.000282	9.046065	0.000000
1700.00	0.153383	-0.002222	0.000263	9.603903	0.000000
1800.00	0.154396	-0.002222	0.000223	10.479539	0.000000
1900.00	0.141141	-0.002222	0.000197	10.216261	0.000000
2000.00	0.133924	-0.002222	0.000176	10.261348	0.000000
2100.00	0.123267	-0.002222	0.000159	9.945561	0.000000
2200.00	0.123097	-0.002222	0.000144	10.448059	0.000000

Right Window: Incremental Spatial Autocorrelation (Spatial Statistics Tools)

- Started: Today at 上午 04:21:45
- Completed: Today at 上午 04:21:45
- Elapsed Time: 0.93 Seconds

Messages (2):

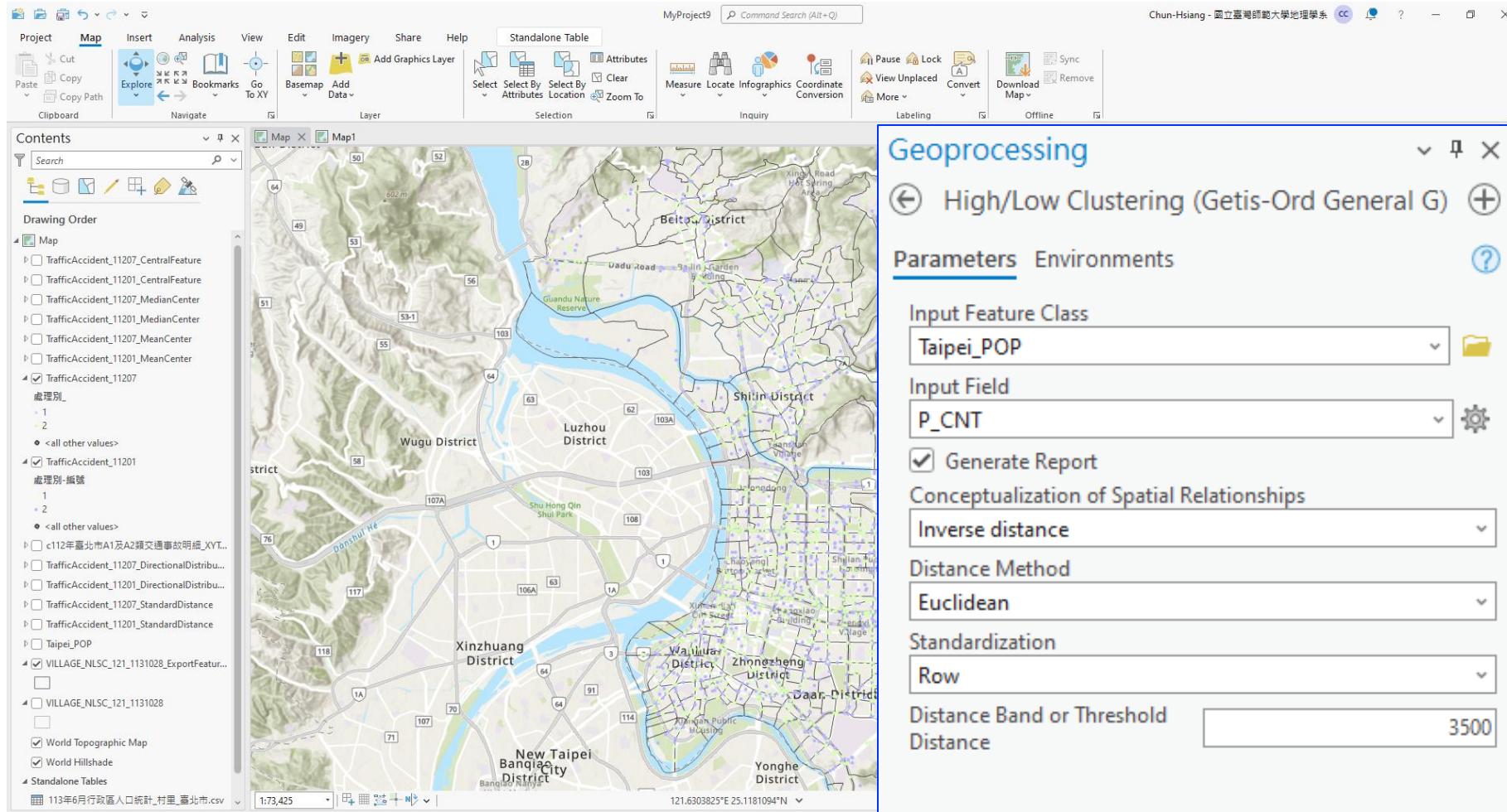
- i: 2500.00, 0.125572, -0.002208, 0.000131, 11.169025, 0.000000
- ! 2600.00, 0.121522, -0.002208, 0.000117, 11.460707, 0.000000

Global Moran's I Summary by Distance

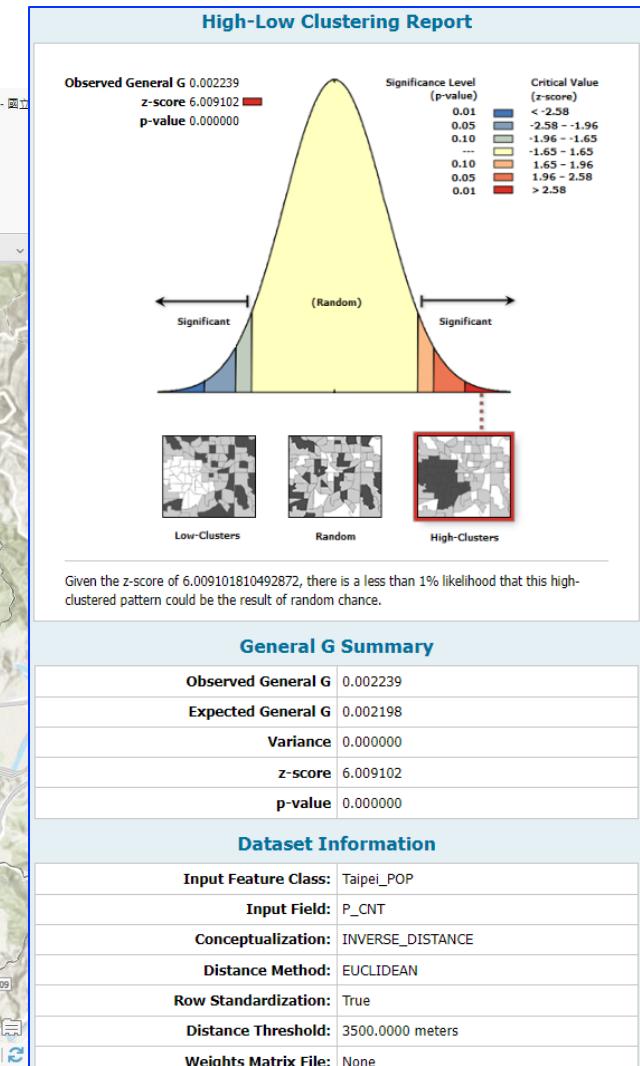
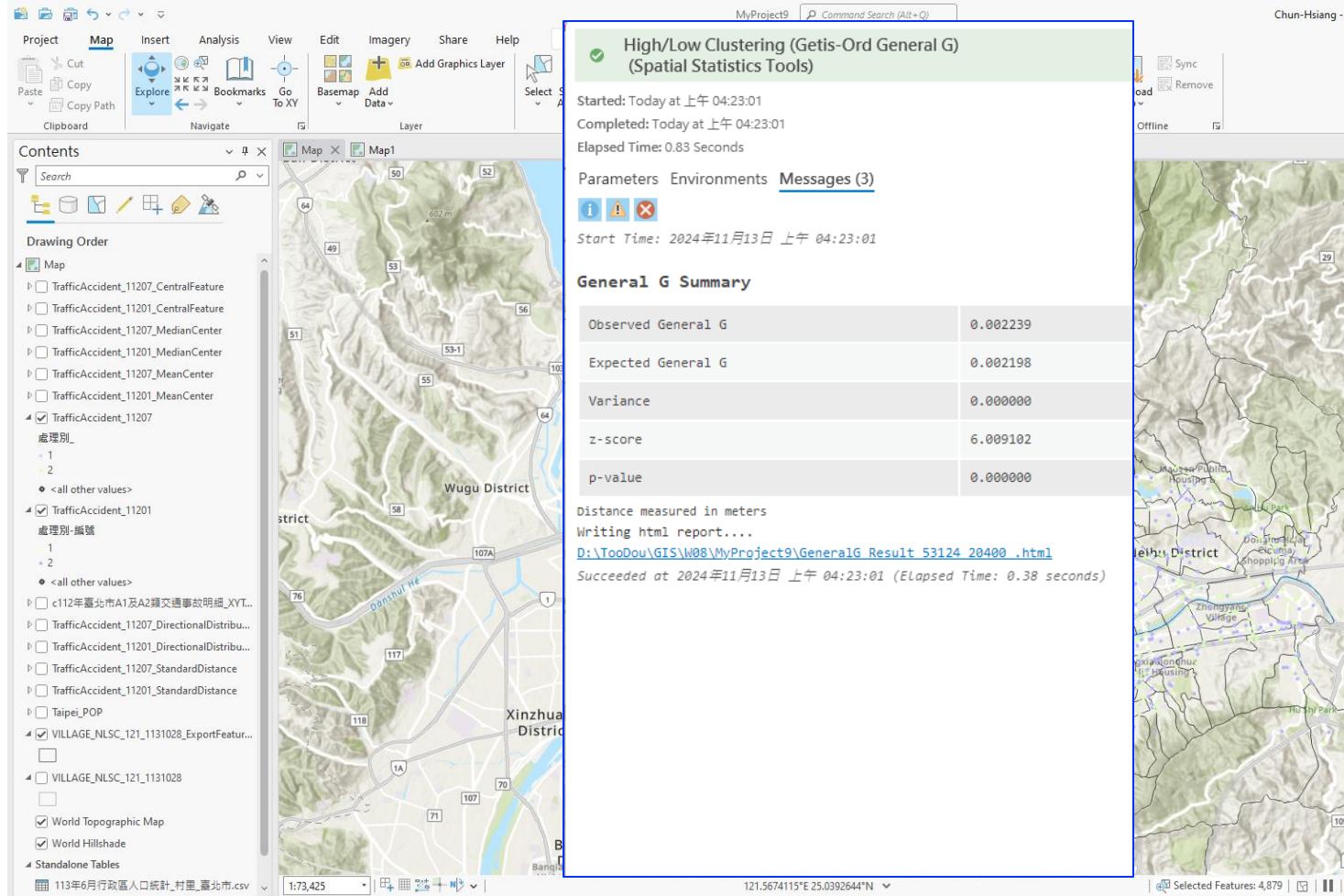
Distance	Moran's Index	Expected Index	Variance	z-score	p-value
2500.00	0.125572	-0.002208	0.000131	11.169025	0.000000
2600.00	0.121522	-0.002208	0.000117	11.460707	0.000000
2700.00	0.127851	-0.002203	0.000112	12.301740	0.000000
2800.00	0.116840	-0.002203	0.000099	11.952736	0.000000
2900.00	0.119902	-0.002198	0.000099	12.262365	0.000000
3000.00	0.112800	-0.002198	0.000093	11.913013	0.000000
3100.00	0.111527	-0.002198	0.000087	12.178951	0.000000
3200.00	0.106464	-0.002198	0.000082	11.974178	0.000000
3300.00	0.100378	-0.002198	0.000072	12.089024	0.000000
3400.00	0.099519	-0.002198	0.000066	12.511444	0.000000
3500.00	0.095681	-0.002198	0.000059	12.731467	0.000000
3600.00	0.091110	-0.002198	0.000056	12.484304	0.000000
3700.00	0.088794	-0.002198	0.000053	12.487737	0.000000
3800.00	0.086515	-0.002198	0.000051	12.476177	0.000000
3900.00	0.086593	-0.002198	0.000048	12.801933	0.000000

First Peak (Distance; Value): 1200.00; 7.126809
Max Peak (Distance; Value): 3500.00; 12.731467
Distance measured in meters
Succeeded at 2024年11月13日 上午 04:21:45 (Elapsed Time: 0.28 seconds)

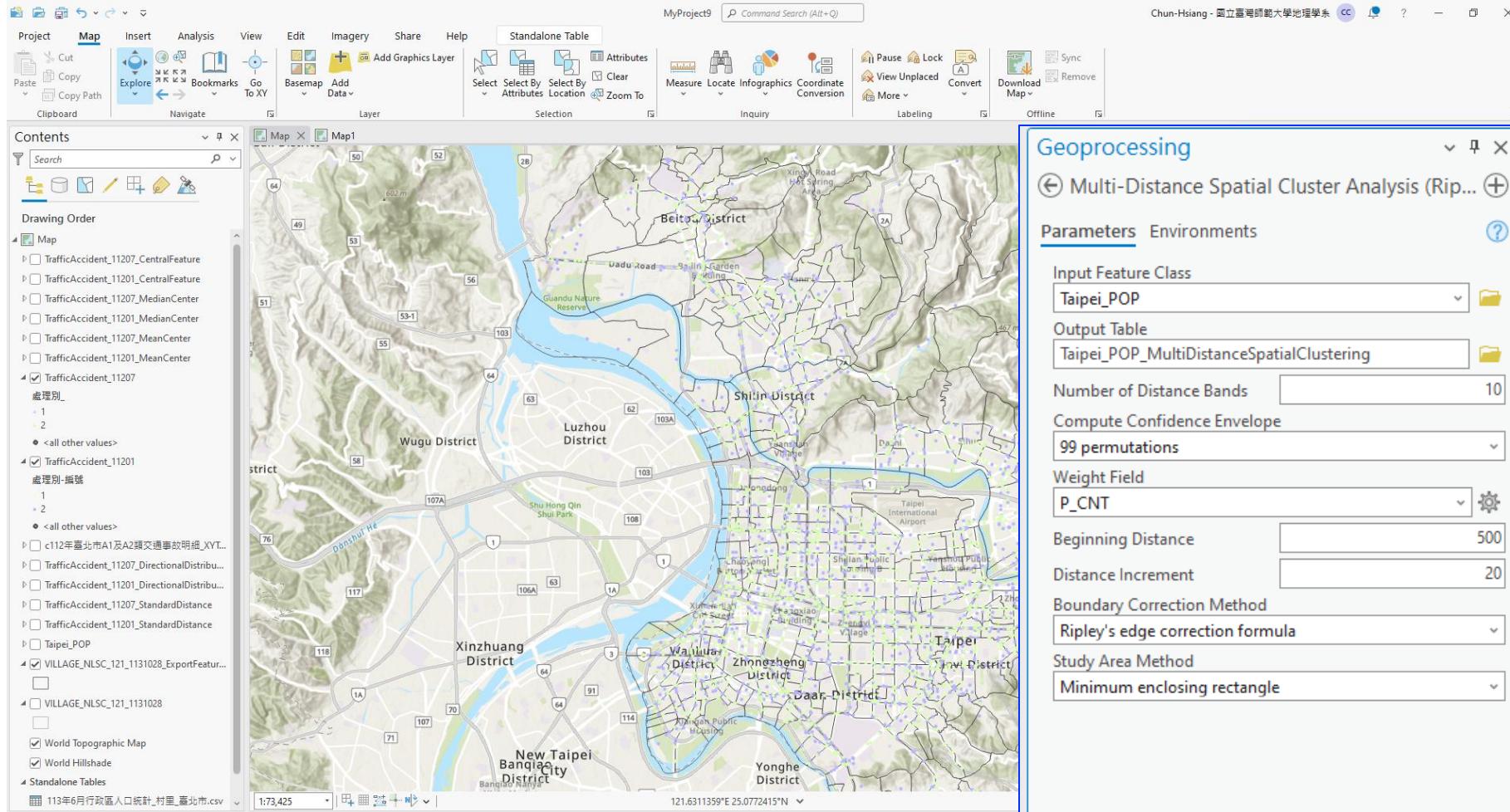
High/Low Clustering (Getis-Ord General G)



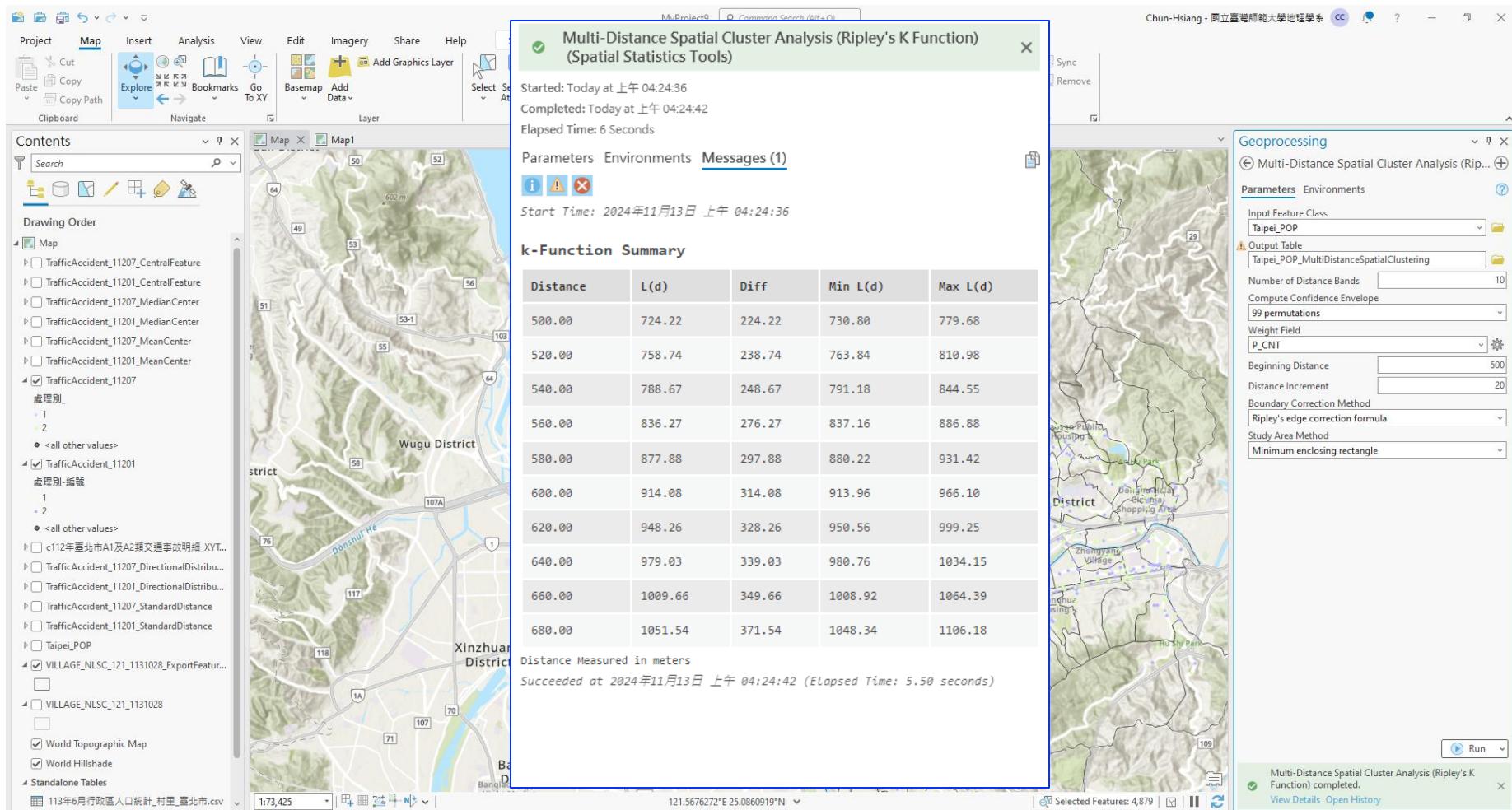
High/Low Clustering (Getis-Ord General G)



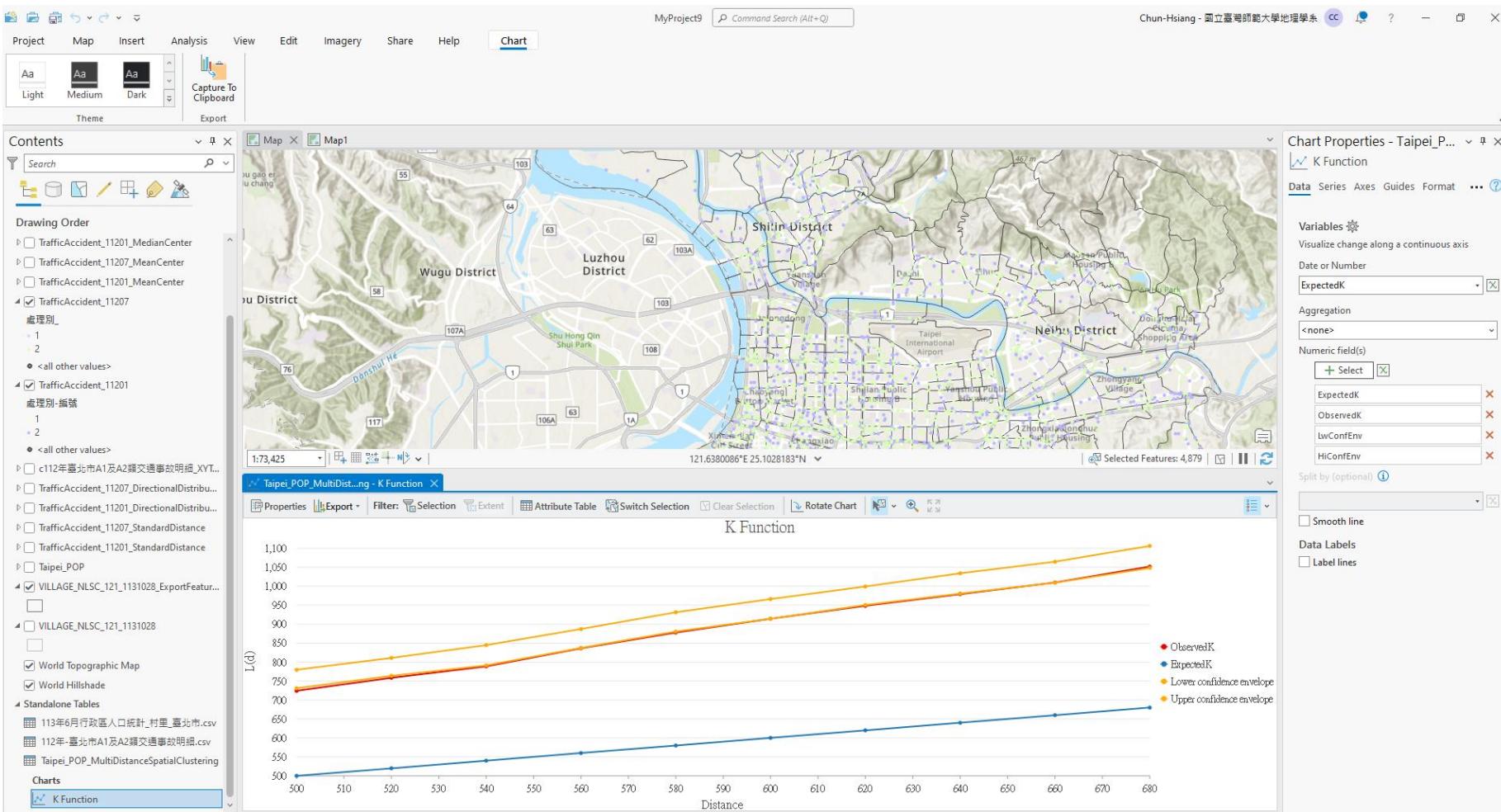
Repley's k-function



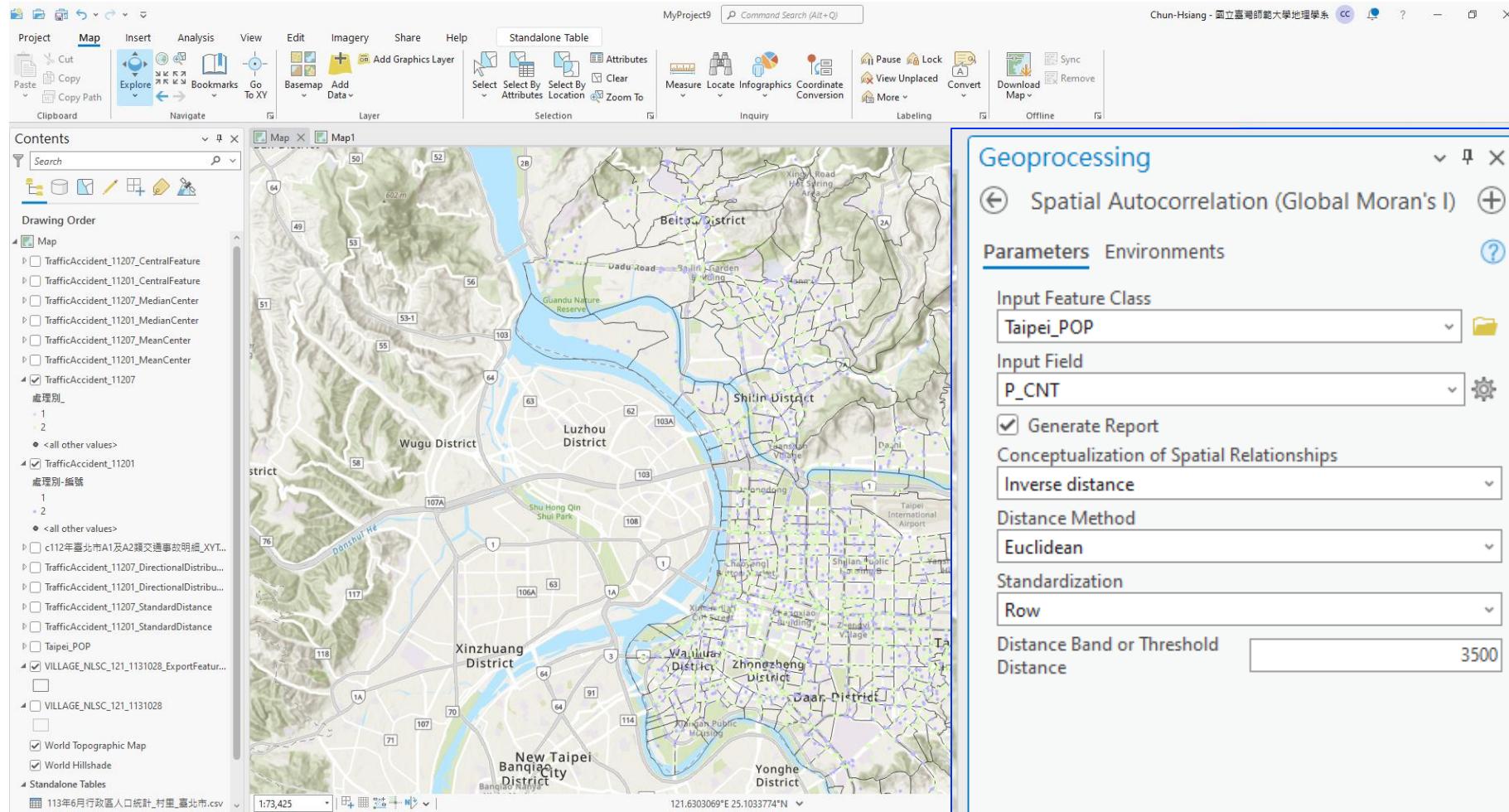
Repley's k-function



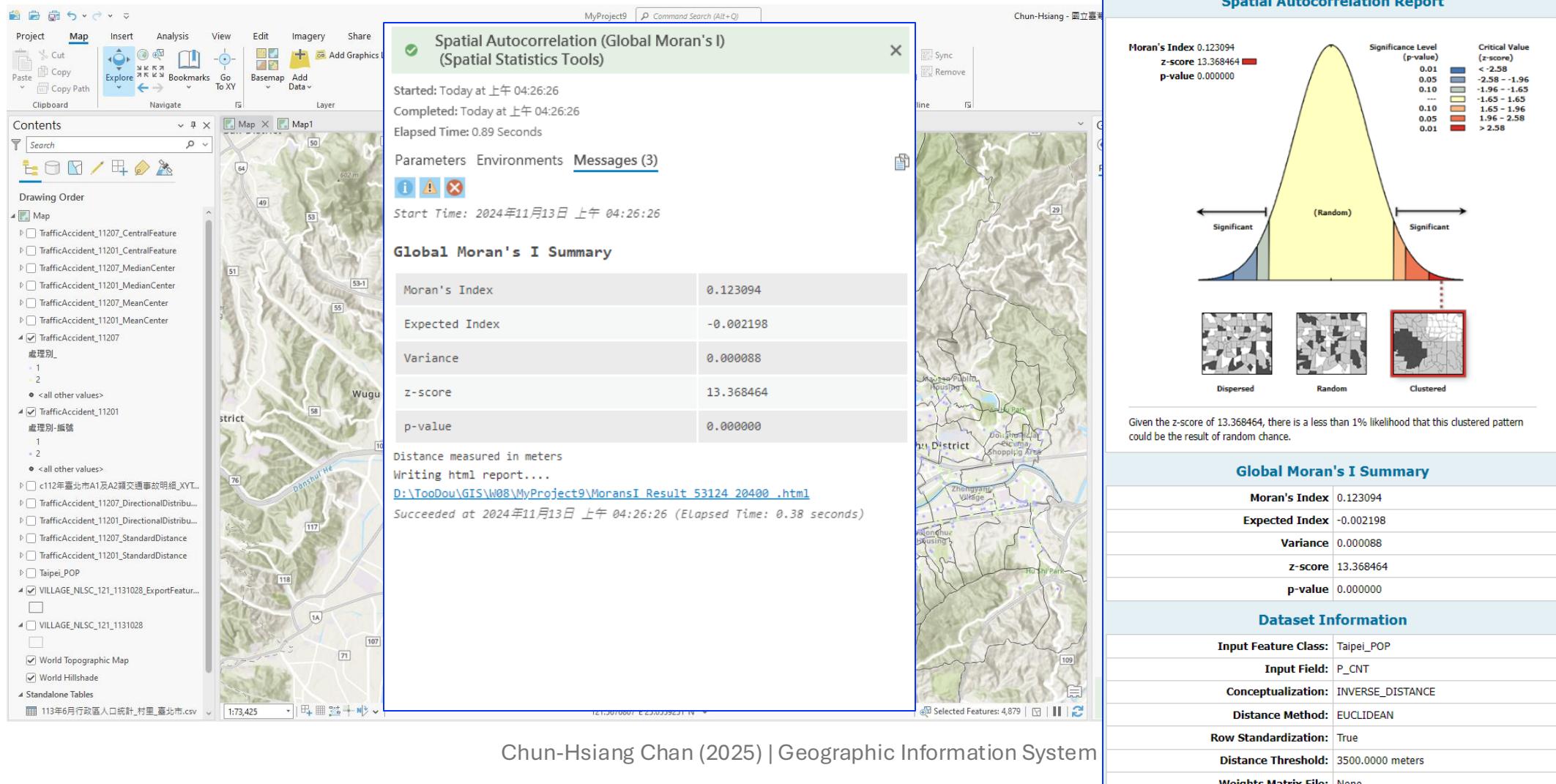
Repley's k -function



Spatial Autocorrelation (Global Moran's I)



Spatial Autocorrelation (Global Moran's I)



The End

Thank you for your attention!

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